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Biomass and length distribution for roughhead grenadier, thorny skate and white hake from the surveys conducted by Spain in NAFO 3NO

by

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Abstract

Data for roughhead grenadier (*Macrourus berglax*), thorny skate (*Amblyraja radiata*) and white hake (*Urophycis tenuis*) from the Spanish Spring survey are presented. Abundance and biomass were estimated for roughhead grenadier and thorny skate for the period 1997-2013 and for white hake for the period 2001-2013. The length distribution is presented as numbers per haul stratified mean catches for the last five years (2009-2013). The roughhead grenadier indices show no trend during the entire period, reaching a maximum in 2004 - 2006 and afterwards stabilised at levels slightly higher than in the early years. Thorny skate indices follow a large oscillating trend, dropping in 2007 and being since then more or less stables at a low level. White hake biomass index was highest in 2001 and showed an overall decreasing trend since then to 2008, reaching almost the level of 2002 in 2013, although at very low levels compared with the 2001 one. A small recruitment event was detected in 2004 and in 2013, with individuals between 16 - 26 cm.

Material and Methods

Spain has carried out a spring survey in Div. 3NO of the NAFO Regulatory Area since 1995. To this purpose, the vessel C/V *Playa de Menduíña*, equipped with a bottom trawl net type *Pedreira* was used until 2001, when it was replaced by the R/V *Vizconde de Eza* with a bottom trawl net type *Campelen*. The technical specifications and geometry of these gears, their rigging profile and the net plan, and an abstract with the survey technical information are described in Walsh *et al.*, 2001. The number of valid tows, the depth strata covered and survey dates for the period 1997-2013 are shown in Table 1. The survey area was stratified following the standard stratification schemes (Bishop, 1994). The number of hauls was assigned to each stratum proportionally to their size on a random way, with a minimum of two planned hauls per stratum

(Doubleday, 1981). Biomass and abundance indices were calculated by swept area method (Cochran, 1997), assuming a catchability factor of 1. The swept area and number of hauls by stratum for the last five years (2009-2013) are presented in Table 2. To know the results of the rest of the years, see González-Troncoso *et al.* (2013).

The catch of each haul is sorted and weighted by species and a sample of each species is length measured. For roughhead grenadier, pre-anal length in 0.5 cm intervals to the inferior 0.5 cm is taken. Thorny skate and white hake are measured to the nearest lower cm of total length. This paper presents the 1997-2013 indices for roughhead grenadier and thorny skate. Years 1995 and 1996 are not representative as the deeper strata were not surveyed those years, thus they are excluded from the analysis. White hake data are only available since 2001.

The indices are presented for each species, transformed until 2000 and no-transformed for the period 2002-2013. Total biomass and stratified mean catches and numbers per year, with annual variance, are presented for the entire period. Indices by strata and length distribution are presented for 2009-2013. To see the results of the rest of the years, see González-Troncoso *et al.* (2013). For 2001 there are both transformed data from C/V *Playa de Menduiña* and original data from R/V *Vizconde de Eza*. White hake data did not need calibration (González Troncoso and Paz, 2005). Further information about the calculation of these indices is available in González Troncoso *et al.* (2005).

Figure 1 presents the maps with the distribution of the catches of the three species during the 2013 Spanish 3NO survey.

Results

Roughhead grenadier

There is no directed fishery for roughhead grenadier. Most of the catches are taken as by-catch in the Greenland halibut fishery in Subareas 2 and 3. At the beginning of the Greenland halibut fishery in Subarea 3 of the Regulatory Area in 1988, grenadier catches were systematically misreported as roundnose grenadier. Grenadier biomass shows a stable or decreasing trend in recent years. Good recruitment is indicated in 2012 but indices of recruitments have high uncertainty (NAFO, 2013).

Mean Catches and Biomass

Mean catch and SD of roughhead grenadier by stratum are presented in Table 3 and biomass in Table 4 for the period 2009-2013. Total biomass and stratified mean catches and SD by year are presented in Table 4 for 1997-2013. The estimated parameters *a* and *b* values of length-weight relationship are presented in Table 6 for the last five years.

The roughhead grenadier indices show no trend during the entire period, reaching a maximum in 2004 - 2006 and afterwards stabilised at levels slightly higher than in the early years (Figures 2 and 3).

Length Distribution

Table 7 and Figure 2 present the mean number for 1997-2013, and Table 8 the same index by length besides the sampled size and catch for the period 2009-2013. Results are presented in length intervals of 1 cm. The 1998 cohort is easily followed, but it has started to disappear over the past years. Recruitment seems to be good recently, especially in 2013, whereas all the length classes were poor, specially the largest (Figures 4 and 5).

Thorny skate

Thorny skate catches comprises the most of the skates catches during the Spanish Spring survey and the Canadian surveys. This species has been managed with a TAC since 2004. Nominal catches increased in the mid-1980s with the beginning of a directed fishery, reaching a minimum during the period 1993-1995. Biomass has been relatively stable from 1996 to 2004, but at a lower level than in the mid-1980s. During recent years the biomass has increased slightly (NAFO, 2013).

Mean Catches and Biomass

Mean catch and SD per stratum are presented in Table 8 for 2009-2013, and biomass by stratum in Table 10. Total annual biomass and stratified mean catches per tow by year, next to their SD, are presented in Table 11 for the entire period. The estimated parameters *a* and *b* values of length-weight relationship for 2009-2013 are presented in Table 12.

Thorny skate indices follow a large oscillating trend, with maximum values of roughly 55 000 tons in 2000 and 2006, and minimum values over 10 000 tons in 1997 and 2011. In 2007 the indices dropped, being since then more or less stables at a low level (Figures 6 and 7).

Length Distribution

Total mean number per tow by year for the period 1997-2013 is shown in Table 13 and Figure 6. Length distribution by sex and year, sample size and catch for the period 2009-2013 are presented in Table 14 and Figures 8 and 9. The recruitment modal value was in 1997 and can be roughly followed until 2013. A second modal value at small lengths starting in 1998 can be roughly followed throughout years, reaching a maximum in 2002. Recruitment was also quite good in 2002, but this cohort is not seen in following years. All length classes have been poorer than usual over the last years, but recruitment was quite good in 2010 when all the length classes had more or less the same level.

White hake

Catches of white hake in Div. 3NO peaked in 1987 and then declined until 1994, with non-Canadian landings dropping to 0 following by fishing restriction for foreign countries in 1992. Average catch reached a minimum in 1995-2001, increased in 2002 and 2003 and declined sharply in 2004-2007. The 1999 year-class was large and prompted the 2000 stock biomass

increase, but following cohorts have been very small in comparison. The stock biomass remains at relatively low levels. No large recruitments have been observed since 2000 (NAFO, 2013).

Mean catches and biomass

Mean catch and SD per stratum are presented in table 15 for years 2009-2013. Table 16 shows the biomass per stratum for the same period. Table 17 presents the total biomass and the stratified mean catch per tow by year, as well as the annual variance, for 1997-2013. In Table 18 there are the length weight relationship parameters for the period 2009-2013.

White hake biomass index was highest in 2001 and shows an overall decreasing trend since then to 2008, with a much smaller peak in 2005. Since 2008 an increase can be seen, reaching almost the level of 2002 in 2013, although at very low levels compared with the 2001 one (Figures 10 and 11).

Length distribution

Table 19 presents the mean number per tow by year for 1997-2013. The length distribution by sex and year, number of samples, sample size, sampled catch, length range, total catch and numbers of hauls can be seen in Table 20 for years 2009-2013. White hake was not sexed in 2011.

Individuals within the length range 30-38 cm were very abundant in 2001 and can be followed the next years, but by 2006 can hardly be seen. A small recruitment event was detected in 2004 and in 2013, with individuals between 16 - 26 cm. All year classes have been poor in 2006-2011. In 2012 a slight increase in the lengths between 40-44 cm can be seen, corresponding to 48-52 cm in 2013.

References

Bishop, C A.. 1994. Revisions and additions to stratification schemes used during research vessel surveys in NAFO subareas 2 and 3. NAFO SCR Doc., Nº 43, Serial nº N2413, 23 pp.

Cochran, W. G.. 1997. Sampling techniques. Ed. J. Wiley and Sons, N.Y., 428 pp.

Doubleday, W. G.. 1981. Manual on groundfish surveys in the Northwest Atlantic. NAFO Sci. Coun. Studies, 2, 55.

González Troncoso, D. and X. Paz. 2005. Biomass and length distribution for Atlantic cod, Thorny skate and White hake from the surveys conducted by Spain NAFO Divisions 3NO. NAFO SCR Doc., 05/26, Serial nº N5112, 29 pp.

González Troncoso, D., X. Paz and F. González. 2005. Results for the Roughhead grenadier from the Spanish surveys conducted in the NAFO Regulatory Area of Divisions 3NO, 1997-2004. NAFO SCR Doc., 05/28, Serial nº N5114, 18 pp.

González Troncoso, D.. E. Guijarro and X. Paz. 2013. Biomass and length distribution for roughhead grenadier, thorny skate and white hake from the surveys conducted by Spain in NAFO 3NO. NAFO SCR Doc., 13/12, Serial nº N56162, 43 pp.

NAFO, 2013. Report of Scientific Council Meeting, 7-20 June 2013

Walsh, J.S., X. Paz and P. Durán. 2001. A preliminary investigation of the efficiency of Canadian and Spanish Survey bottom trawls on the Southern Bank. NAFO SCR Doc., 01/74, Serial nº N4453, 18 pp.

Table 1.- Spanish spring bottom trawl surveys in NAFO Div. 3NO: 1997-2013

Year	Vessel	Valid tows	Depth strata covered (m)	Dates
1997	C/V *Playa de Menduíña*	128	42-1263	April 26-May 18
1998	C/V *Playa de Menduíña*	124	42-1390	May 06-May 26
1999	C/V *Playa de Menduíña*	114	41-1381	May 07-May 26
2000	C/V *Playa de Menduíña*	118	42-1401	May 07-May 28
2001(*)	R/V *Vizconde de Eza*	83	36-1156	May 03-May 24
	C/V *Playa de Menduíña*	121	40-1500	May 05-May 23
2002	R/V *Vizconde de Eza*	125	38-1540	April 29-May 19
2003	R/V *Vizconde de Eza*	118	38-1666	May 11-June 02
2004	R/V *Vizconde de Eza*	120	43-1539	June 06–June 24
2005	R/V *Vizconde de Eza*	119	47-1485	June 10–June 29
2005	R/V *Vizconde de Eza*	119	47-1485	June 10–June 29
2006	R/V *Vizconde de Eza*	120	45-1480	June 7–June 27
2007	R/V *Vizconde de Eza*	110	45-1374	May 29–June 19
2008	R/V *Vizconde de Eza*	122	45-1374	May 27–June 16
2009	R/V *Vizconde de Eza*	109	45-1374	May 31–June 18
2010	R/V *Vizconde de Eza*	95	45-1374	May 30–June 18
2011	R/V *Vizconde de Eza*	122	44-1450	June 5–June 24
2012	R/V *Vizconde de Eza*	122	44-1450	June 3–June 21
2013	R/V *Vizconde de Eza*	122	44-1450	June 1–June 21

(*) A total of 83 hauls from the R/V *Vizconde de Eza* and 40 hauls from the C/V *Playa de Menduíña* (123 hauls in total) were used for data analysis.

Table 2.- Swept area and number of hauls by stratum. Spanish Spring Surveys in NAFO Div. 3NO: 2009-2013. Swept area in square miles. n.s. means stratum not surveyed.

	2009		2010		2011		2012		2103	
Stratum	Swept area	Tow number	Swept area	Tow number	Swept area	Tow number	Swept area	Tow number	Swept area	Tow number
353	0.0345	3	0.0225	2	0.0349	3	0.0338	3	0.0349	3
354	0.0338	3	0.0225	2	0.0345	3	0.0338	3	0.0338	3
355	0.0233	2	0.0229	2	0.0233	2	0.0229	2	0.0225	2
356	0.0229	2	0.0225	2	0.0229	2	0.0225	2	0.0225	2
357	0.0116	2	0.0225	2	0.0225	2	0.0229	2	0.0236	2
358	0.0341	3	0.0225	2	0.0345	3	0.0330	3	0.0338	3
359	0.0795	7	0.0705	6	0.0806	7	0.0806	7	0.0829	7
360	0.2273	20	0.1628	14	0.2374	20	0.2344	20	0.2231	19
374	0.0225	2	0.0225	2	0.0225	2	0.0229	2	0.0233	2
375	0.0341	3	0.0364	3	0.0360	3	0.0349	3	0.0360	3
376	0.1133	10	0.0788	7	0.1178	10	0.1181	10	0.1305	11
377	0.0225	2	0.0233	2	0.0233	2	0.0229	2	0.0236	2
378	0.0229	2	0.0225	2	0.0240	2	0.0229	2	0.0225	2
379	0.0229	2	0.0229	2	0.0221	2	0.0225	2	0.0240	2
380	0.0229	2	0.0236	2	0.0229	2	0.0229	2	0.0229	2
381	0.0229	2	0.0244	2	0.0233	2	0.0221	2	0.0244	2
382	0.0450	4	0.0233	2	0.0450	4	0.0454	4	0.0484	4
721	0.0229	2	0.0225	2	0.0229	2	0.0233	2	0.0225	2
722	0.0225	2	0.0225	2	0.0225	2	0.0221	2	0.0221	2
723	0.0225	2	0.0225	2	0.0218	2	0.0225	2	0.0221	2
724	0.0233	2	0.0229	2	0.0233	2	0.0225	2	0.0225	2
725	0.0229	2	0.0233	2	0.0240	2	0.0225	2	0.0229	2
726	0.0229	2	0.0233	2	0.0225	2	0.0221	2	0.0221	2
727	0.0113	1	0.0240	2	0.0225	2	0.0233	2	0.0229	2
728	0.0229	2	0.0240	2	0.0229	2	0.0229	2	0.0233	2
752	0.0229	2	0.0240	2	0.0236	2	0.0229	2	0.0233	2
753	0.0116	1	n.s.	n.s.	0.0225	2	0.0221	2	0.0236	2
754	0.0113	1	0.0225	2	0.0225	2	0.0221	2	0.0240	2
755	0.0116	1	0.0120	1	0.0454	4	0.0446	4	0.0454	4
756	0.0225	2	0.0225	2	0.0206	2	0.0221	2	0.0229	2
757	0.0229	2	0.0221	2	0.0236	2	0.0214	2	0.0240	2
758	0.0225	2	0.0225	2	0.0225	2	0.0221	2	0.0225	2
759	0.0113	1	0.0225	2	0.0218	2	0.0221	2	0.0225	2
760	0.0229	2	0.0225	2	0.0214	2	0.0225	2	0.0229	2
761	0.0225	2	0.0229	2	0.0236	2	0.0221	2	0.0225	2
762	0.0225	2	0.0229	2	0.0225	2	0.0225	2	0.0218	2
763	n.s.	n.s.	n.s.	n.s.	0.0349	3	0.0330	3	0.0341	3
764	0.0116	1	n.s.	n.s.	0.0225	2	0.0225	2	0.0214	2
765	0.0225	2	0.0225	2	0.0225	2	0.0229	2	0.0221	2
766	0.0225	2	0.0225	2	0.0225	2	0.0225	2	0.0221	2
767	n.s.	n.s.	n.s.	n.s.	0.0233	2	0.0203	2	0.0218	2

Table 3.- Roughhead grenadier mean catch (kg) and SD by stratum. Spanish Spring Surveys in NAFO Div. 3NO: 2009-2013. n.s. means stratum not surveyed.

	2009		2010		2011		2012		2013	
Stratum	R. grenadier Mean catch	R. grenadier SD	R. grenadier Mean catch	R. grenadier SD	R. grenadier Mean catch	R. grenadier SD	R. grenadier Mean catch	R. grenadier SD	R. grenadier Mean catch	R. grenadier SD
353	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
354	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
355	1.23	1.73	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
356	0.00	0.00	0.11	0.16	0.00	0.00	0.00	0.00	0.00	0.00
357	15.89	19.16	3.87	3.50	7.24	10.05	8.39	3.24	2.33	1.65
358	0.00	0.00	0.00	0.00	0.31	0.53	1.47	2.54	0.91	1.57
359	0.07	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
360	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
374	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
375	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
376	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
377	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
378	0.00	0.00	1.19	1.68	0.44	0.62	2.40	3.40	0.00	0.00
379	7.14	3.62	17.11	1.62	1.93	0.99	8.22	3.51	13.66	12.96
380	7.53	9.15	25.55	0.21	53.85	58.20	8.30	6.04	9.39	3.60
381	0.00	0.00	0.18	0.25	119.68	136.08	2.47	3.49	5.40	7.64
382	0.00	0.00	0.00	0.00	7.48	14.95	0.27	0.54	0.00	0.00
721	4.20	0.78	1.04	0.50	0.83	0.40	2.02	0.86	0.29	0.41
722	0.74	0.72	3.52	2.23	1.85	0.77	8.63	10.28	7.76	8.49
723	18.00	3.83	4.12	0.21	3.63	0.05	10.45	9.96	5.19	0.26
724	9.93	4.26	5.18	0.84	3.33	4.52	5.35	1.69	10.39	0.90
725	5.91	1.63	10.95	3.04	8.92	7.81	13.53	5.63	5.60	0.83
726	34.43	22.03	41.60	18.95	21.87	20.26	30.81	13.02	27.51	3.17
727	7.94	-	12.45	1.34	6.80	1.28	8.15	2.49	22.39	18.26
728	7.34	2.18	19.71	7.63	6.26	0.50	10.39	9.21	16.31	11.29
752	30.59	14.29	80.55	70.22	4.56	3.32	11.15	1.34	4.83	4.11
753	117.40	-	n.s.	n.s.	35.40	45.07	76.91	98.85	30.85	42.46
754	145.50	-	69.06	94.82	11.42	4.15	42.59	9.25	59.78	42.87
755	11.29	-	10.44	-	14.55	11.44	52.28	26.15	24.14	18.70
756	39.31	29.38	9.18	5.20	40.31	53.81	57.00	8.77	20.34	12.95
757	18.68	1.58	11.81	0.84	42.74	11.74	156.42	48.62	28.18	33.58
758	43.93	8.73	8.69	1.76	12.36	14.74	25.56	2.90	19.34	3.10
759	48.81	-	14.24	7.30	6.93	7.50	16.33	7.16	40.76	5.78
760	22.89	6.63	6.66	4.97	16.44	21.69	2.31	3.27	5.92	0.94
761	10.15	1.92	90.08	121.09	7.83	1.08	6.67	3.75	4.76	6.34
762	10.32	7.90	24.26	19.01	33.37	21.68	29.68	21.80	12.39	4.62
763	n.s.	n.s.	n.s.	n.s.	10.09	8.23	5.94	6.08	17.93	13.97
764	20.54	-	n.s.	n.s.	9.60	13.06	1.37	1.93	4.89	1.58
765	6.49	0.90	1.85	1.82	1.68	1.84	2.48	2.59	3.83	4.79
766	1.95	0.63	1.98	1.43	3.11	3.25	1.25	0.92	2.08	1.15
767	n.s.	n.s.	n.s.	n.s.	2.41	1.16	0.72	0.02	2.05	1.27

Table 4.- Roughhead grenadier survey biomass (t) by stratum in NAFO Div. 3NO: 2009-2013. n.s. means stratum not surveyed.

Strata	2009	2010	2011	2012	2013
353	0	0	0	0	0
354	0	0	0	0	0
355	8	0	0	0	0
356	0	0	0	0	0
357	448	56	105	120	32
358	0	0	6	30	18
359	3	0	0	0	0
360	0	0	0	0	0
374	0	0	0	0	0
375	0	0	0	0	0
376	0	0	0	0	0
377	0	0	0	0	0
378	0	15	5	29	0
379	66	159	18	77	121
380	63	208	452	70	79
381	0	2	1482	32	64
382	0	0	228	8	0
721	24	6	5	11	2
722	6	26	14	66	59
723	248	57	52	144	73
724	106	56	36	59	114

Strata	2009	2010	2011	2012	2013
725	54	99	78	126	51
726	217	258	140	200	179
727	68	100	58	67	188
728	50	128	43	71	109
752	350	879	51	128	54
753	1394	0	434	959	360
754	2328	1105	183	693	897
755	374	335	494	1804	819
756	353	82	395	520	180
757	167	109	369	1493	239
758	387	76	109	229	170
759	551	161	81	187	460
760	308	91	237	32	80
761	154	1347	113	103	72
762	194	450	629	559	242
763	n.s.	0	227	141	411
764	177	0	85	12	46
765	71	20	19	27	43
766	25	25	40	16	27
767	n.s.	0	33	11	30

Table 5.- Roughhead grenadier survey biomass (t) with SD and stratified mean catch per tow (kg) and SD by in NAFO Div. 3NO: 1997-2013.

Year	1997	1998	1999	2000	2001	2002	2003	2004	2005
Biomass	3340	6922	4357	7000	5568	4968	6860	11402	10064
SD	290	644	431	807	700	1365	1316	2043	1236
MCPT	3.81	7.05	4.53	7.08	5.73	5.46	7.40	12.09	11.10
SD	0.31	0.61	0.45	0.85	0.77	1.51	1.42	2.17	1.38

Year	2006	2007	2008	2009	2010	2011	2012	2013
Biomass	10010	5760	7521	8193	5850	6219	8027	5220
SD	1716	695	1028	286	1773	1508	1073	753
MCPT	11.11	6.93	7.93	9.15	6.97	6.82	8.59	5.81
SD	1.89	0.83	1.11	0.40	2.10	1.61	1.18	0.85

Table 6.- Roughhead grenadier length weight relationships in Spanish Spring Surveys in NAFO Div. 3NO: 2009-2013. E(x) means Error of the parameter x.

	Males						Females						Total					
	a	**b**	**E(a)**	**E(b)**	**R2**	**N**	**a**	**b**	**E(a)**	**E(b)**	**R2**	**N**	**a**	**b**	**E(a)**	**E(b)**	**R2**	**N**
2009	**0.08107**	**2.99748**	0.1408	0.0554	0.988	217	**0.1202**	**2.8658**	0.0194	0.0551	0.997	465	**0.1179**	**2.8704**	0.0743	0.0271	0.995	710
2010	**0.08245**	**3.00029**	0.2275	0.0892	0.968	210	**0.1225**	**2.8545**	0.0986	0.0341	0.992	449	**0.1506**	**2.7834**	0.135	0.0492	0.982	665
2011	**0.17321**	**2.75079**	0.1574	0.062	0.982	415	**0.1350**	**2.8396**	0.0955	0.0334	0.992	769	**0.1368**	**2.8363**	0.0727	0.0263	0.995	1210
2012	**0.29835**	**2.55865**	0.1689	0.0654	0.988	551	**0.1725**	**2.7562**	0.0689	0.0242	0.998	1032	**0.3390**	**2.5323**	0.0919	0.0339	0.994	1614
2013	**0.11695**	**2.86549**	0.0803	0.0318	0.996	478	**0.1103**	**2.8903**	0.0447	0.0155	0.998	982	**0.1315**	**2.8331**	0.0474	0.0169	0.998	1580

Table 7.- Roughhead grenadier mean number per tow by year in Spanish Spring Surveys in NAFO Div. 3NO: 1997-2013. Indet. means indeterminate.

	1997				1998				1999				2000				2001			
	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total
MNPT	3.654	5.191	0.000	8.845	8.176	9.385	0.039	17.600	7.712	9.565	0.033	17.309	10.087	13.633	0.050	23.770	8.149	9.677	0.125	17.952

	2002				2003				2004				2005				2006			
	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total
MNPT	4.352	7.622	0.090	12.063	8.655	11.875	0.108	20.638	11.623	16.579	0.763	28.964	9.762	15.641	0.403	25.807	8.775	13.935	0.152	22.862

	2007				2008				2009				2010				2011			
	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total
MNPT	5.432	8.365	0.744	14.541	5.260	8.890	0.073	14.223	5.072	11.265	0.372	16.709	4.238	7.705	0.367	12.310	3.923	6.787	0.174	10.884

	2012				2013			
	Males	Females	Indet.	Total	Males	Females	Indet.	Total
MNPT	5.115	10.678	0.304	16.097	3.481	6.879	0.780	11.139

Table 8.- Roughhead grenadier mean number per tow by length class and year. Spanish Spring Survey in NAFO 3NO: 2009-2013. Indet. means indeterminate.

	2009				2010				2011				2012				2013			
Lenght (cm.)	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total
1.5	0.000	0.000	0.005	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.009	0.000	0.000	0.000	0.000
2.5	0.000	0.000	0.015	0.015	0.000	0.000	0.151	0.151	0.000	0.000	0.000	0.000	0.000	0.000	0.083	0.083	0.000	0.000	0.026	0.026
3.5	0.006	0.000	0.233	0.239	0.041	0.007	0.209	0.257	0.005	0.005	0.148	0.158	0.000	0.000	0.178	0.178	0.032	0.018	0.606	0.656
4.5	0.023	0.005	0.022	0.050	0.011	0.011	0.000	0.022	0.006	0.000	0.014	0.020	0.025	0.025	0.026	0.077	0.007	0.008	0.075	0.091
5.5	0.029	0.041	0.043	0.114	0.074	0.045	0.007	0.125	0.027	0.013	0.000	0.040	0.183	0.162	0.007	0.352	0.060	0.054	0.031	0.144
6.5	0.134	0.173	0.053	0.361	0.461	0.334	0.000	0.795	0.070	0.069	0.000	0.139	0.452	0.668	0.000	1.120	0.152	0.121	0.038	0.310
7.5	0.076	0.138	0.000	0.213	0.102	0.075	0.000	0.177	0.043	0.052	0.000	0.095	0.186	0.162	0.000	0.348	0.039	0.078	0.000	0.117
8.5	0.220	0.261	0.000	0.481	0.132	0.059	0.000	0.191	0.152	0.149	0.000	0.301	0.227	0.298	0.000	0.526	0.247	0.328	0.004	0.580
9.5	0.167	0.211	0.000	0.378	0.087	0.131	0.000	0.218	0.141	0.141	0.000	0.282	0.221	0.406	0.000	0.627	0.195	0.364	0.000	0.559
10.5	0.235	0.324	0.000	0.559	0.164	0.300	0.000	0.464	0.048	0.087	0.000	0.134	0.450	0.462	0.000	0.912	0.212	0.238	0.000	0.450
11.5	0.275	0.421	0.000	0.696	0.173	0.229	0.000	0.403	0.067	0.103	0.013	0.183	0.304	0.433	0.000	0.737	0.167	0.284	0.000	0.452
12.5	0.225	0.514	0.000	0.739	0.166	0.200	0.000	0.366	0.122	0.126	0.000	0.248	0.216	0.338	0.000	0.555	0.212	0.317	0.000	0.530
13.5	0.358	0.583	0.000	0.941	0.301	0.301	0.000	0.602	0.274	0.276	0.000	0.550	0.334	0.408	0.000	0.742	0.178	0.295	0.000	0.473
14.5	0.592	0.834	0.000	1.426	0.282	0.413	0.000	0.696	0.260	0.380	0.000	0.640	0.418	0.446	0.000	0.864	0.237	0.314	0.000	0.551
15.5	0.633	0.692	0.000	1.325	0.444	0.424	0.000	0.868	0.472	0.337	0.000	0.808	0.471	0.584	0.000	1.055	0.211	0.287	0.000	0.498
16.5	0.812	0.879	0.000	1.691	0.593	0.461	0.000	1.055	0.574	0.507	0.000	1.081	0.489	0.568	0.000	1.057	0.330	0.437	0.000	0.767
17.5	0.476	0.849	0.000	1.324	0.491	0.520	0.000	1.011	0.598	0.419	0.000	1.017	0.476	0.553	0.000	1.029	0.430	0.361	0.000	0.791
18.5	0.267	0.487	0.000	0.754	0.259	0.529	0.000	0.789	0.547	0.522	0.000	1.069	0.309	0.445	0.000	0.754	0.275	0.361	0.000	0.636
19.5	0.270	0.330	0.000	0.600	0.254	0.246	0.000	0.500	0.254	0.520	0.000	0.774	0.171	0.594	0.000	0.765	0.219	0.339	0.000	0.558
20.5	0.101	0.408	0.000	0.509	0.052	0.321	0.000	0.374	0.148	0.540	0.000	0.689	0.085	0.421	0.000	0.506	0.122	0.368	0.000	0.490
21.5	0.095	0.426	0.000	0.522	0.068	0.256	0.000	0.324	0.067	0.283	0.000	0.350	0.018	0.531	0.000	0.549	0.058	0.318	0.000	0.376
22.5	0.048	0.535	0.000	0.583	0.020	0.270	0.000	0.290	0.032	0.208	0.000	0.239	0.037	0.401	0.000	0.438	0.039	0.244	0.000	0.283
23.5	0.027	0.390	0.000	0.418	0.016	0.321	0.000	0.337	0.000	0.282	0.000	0.282	0.029	0.297	0.000	0.326	0.015	0.212	0.000	0.226
24.5	0.000	0.665	0.000	0.665	0.035	0.354	0.000	0.388	0.014	0.271	0.000	0.286	0.007	0.360	0.000	0.368	0.030	0.217	0.000	0.247
25.5	0.000	0.551	0.000	0.551	0.000	0.476	0.000	0.476	0.000	0.350	0.000	0.350	0.007	0.353	0.000	0.360	0.005	0.192	0.000	0.197
26.5	0.000	0.519	0.000	0.519	0.000	0.436	0.000	0.436	0.000	0.307	0.000	0.307	0.000	0.412	0.000	0.412	0.000	0.193	0.000	0.193
27.5	0.003	0.474	0.000	0.477	0.011	0.335	0.000	0.346	0.000	0.269	0.000	0.269	0.000	0.387	0.000	0.387	0.000	0.203	0.000	0.203
28.5	0.000	0.154	0.000	0.154	0.000	0.201	0.000	0.201	0.000	0.207	0.000	0.207	0.000	0.380	0.000	0.380	0.000	0.148	0.000	0.148
29.5	0.000	0.177	0.000	0.177	0.000	0.201	0.000	0.201	0.000	0.163	0.000	0.163	0.000	0.210	0.000	0.210	0.010	0.208	0.000	0.218
30.5	0.000	0.087	0.000	0.087	0.000	0.095	0.000	0.095	0.000	0.102	0.000	0.102	0.000	0.111	0.000	0.111	0.000	0.112	0.000	0.112
31.5	0.000	0.052	0.000	0.052	0.000	0.061	0.000	0.061	0.000	0.042	0.000	0.042	0.000	0.102	0.000	0.102	0.000	0.093	0.000	0.093
32.5	0.000	0.024	0.000	0.024	0.000	0.043	0.000	0.043	0.000	0.029	0.000	0.029	0.000	0.069	0.000	0.069	0.000	0.053	0.000	0.053
33.5	0.000	0.029	0.000	0.029	0.000	0.028	0.000	0.028	0.000	0.014	0.000	0.014	0.000	0.037	0.000	0.037	0.000	0.054	0.000	0.054
34.5	0.000	0.000	0.000	0.000	0.000	0.009	0.000	0.009	0.000	0.007	0.000	0.007	0.000	0.043	0.000	0.043	0.000	0.035	0.000	0.035
35.5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.000	0.005
36.5	0.000	0.008	0.000	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
37.5	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.011	0.000	0.008	0.000	0.008	0.000	0.006	0.000	0.006	0.000	0.006	0.000	0.006
38.5	0.000	0.023	0.000	0.023	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
39.5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.010	0.000	0.010
40.5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
41.5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
42.5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	5.072	11.265	0.372	16.709	4.238	7.705	0.367	12.310	3.923	6.787	0.174	10.884	5.115	10.678	0.304	16.097	3.481	6.879	0.780	11.139
Nº samples:				46				48				62				57				58
Nº Ind.:	430	940	45	1415	580	1030	48	1658	470	859	27	1356	779	1572	49	2400	535	1051	131	1717
Sampled catch:				723				929				862				1281				883
Range:				1.5-38.5				2-37.5				3-37				1.5-37.5				2.5-39
Total catch:				945				940				1049				1341				885
Total hauls:				110				95				122				122				122

Table 9.- Thorny skate mean catch (kg) and SD by stratum. Spanish Spring Surveys in NAFO Div. 3NO: 2009-2013. n.s. means stratum not surveyed.

	2009		2010		2011		2012		2013	
	T. skate	T. skate	T. skate	T. skate	T. skate	T. skate	T. skate	T. skate	T. skate	T. skate
Stratum	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
353	39.40	49.72	32.65	38.25	21.75	17.88	16.21	9.68	25.00	16.04
354	53.70	35.95	20.00	2.55	22.70	7.23	50.23	56.37	58.00	38.97
355	10.80	0.57	26.03	28.95	28.30	33.98	11.00	3.82	5.84	8.26
356	30.59	27.17	21.48	24.36	22.69	12.07	44.78	63.33	49.23	35.62
357	46.26	47.49	2.10	2.97	8.07	11.41	4.07	1.00	5.06	1.22
358	17.42	15.08	21.60	30.55	15.61	1.80	6.68	5.90	28.31	44.81
359	36.17	56.57	24.75	40.89	21.97	14.37	22.32	14.07	30.80	21.34
360	27.22	33.73	34.64	45.58	18.21	15.05	57.72	46.64	40.01	34.95
374	0.00	0.00	1.92	2.71	5.67	8.02	0.00	0.00	17.11	17.68
375	5.27	5.35	1.44	2.49	1.17	2.03	18.17	20.62	26.36	4.11
376	41.19	39.19	40.33	32.79	11.78	10.84	93.55	39.65	36.09	29.69
377	2.44	3.44	7.11	4.83	7.82	6.03	15.78	3.49	8.85	4.99
378	11.87	16.79	27.23	32.15	19.33	4.29	19.84	15.67	9.87	3.75
379	15.35	21.71	4.19	4.94	20.33	23.14	6.60	2.55	1.98	2.80
380	10.38	10.21	57.37	58.61	111.27	103.65	30.57	31.27	18.07	20.54
381	0.00	0.00	0.14	0.16	20.31	14.74	7.62	5.73	9.16	12.95
382	0.00	0.00	6.79	6.52	6.38	5.39	0.10	0.20	8.70	7.54
721	116.69	145.25	27.81	19.22	7.23	3.80	17.40	24.61	53.58	32.88
722	1.90	2.69	2.50	3.54	5.63	7.95	5.60	7.92	5.21	1.96
723	19.28	9.23	5.46	0.44	3.05	4.31	12.27	10.39	8.13	6.70
724	3.40	4.81	10.22	14.45	2.95	4.17	0.00	0.00	0.00	0.00
725	3.23	4.56	4.61	6.49	2.44	3.45	0.00	0.00	1.90	2.51
726	38.98	21.11	7.20	1.36	1.98	2.80	0.00	0.00	3.34	4.72
727	111.50	-	28.85	16.01	9.29	13.14	5.62	3.37	2.73	3.80
728	53.78	27.40	5.56	3.20	0.00	0.00	12.05	6.54	11.35	5.58
752	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
753	0.00	-	n.s.	n.s.	0.00	0.00	0.00	0.00	0.00	0.00
754	0.00	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
755	0.00	-	0.00	-	0.00	0.00	0.00	0.00	0.00	0.00
756	2.46	3.48	1.73	2.45	0.00	0.00	0.00	0.00	0.00	0.00
757	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
758	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
759	0.00	-	0.00	0.00	0.00	0.00	3.03	4.28	0.00	0.00
760	2.92	4.13	2.70	3.82	0.00	0.00	0.00	0.00	0.00	0.00
761	0.00	0.00	2.80	3.96	0.00	0.00	4.80	6.79	0.00	0.00
762	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
763	n.s.	n.s.	n.s.	n.s.	0.00	0.00	0.00	0.00	0.00	0.00
764	0.00	-	n.s.	n.s.	0.00	0.00	6.80	9.62	4.80	6.79
765	0.00	0.00	0.00	0.00	0.00	0.00	0.92	1.30	0.00	0.00
766	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
767	n.s.	n.s.	n.s.	n.s.	0.00	0.00	0.00	0.00	0.00	0.00

Table 10.- Thorny skate survey biomass (t) by stratum in NAFO Div. 3NO: 2009-2013. n.s. means stratum not surveyed.

Strata	2009	2010	2011	2012	2013	Strata	2009	2010	2011	2012	2013
353	922	781	503	388	578	**725**	30	42	21	0	17
354	1174	437	486	1098	1268	**726**	245	45	13	0	22
355	69	168	180	71	38	**727**	951	231	79	46	23
356	126	90	93	187	206	**728**	367	36	0	82	76
357	1305	31	118	58	70	**752**	0	0	0	0	0
358	344	432	305	137	566	**753**	0	n.s.	0	0	0
359	1347	887	803	816	1095	**754**	0	0	0	0	0
360	6666	8293	4271	13707	9483	**755**	0	0	0	0	0
374	0	36	108	0	315	**756**	22	16	0	0	0
375	125	32	26	423	595	**757**	0	0	0	0	0
376	4852	4782	1334	10564	4058	**758**	0	0	0	0	0
377	22	61	67	138	75	**759**	0	0	0	35	0
378	144	336	224	241	122	**760**	39	37	0	0	0
379	142	39	195	62	17	**761**	0	42	0	74	0
380	87	466	934	257	152	**762**	0	0	0	0	0
381	0	2	252	99	108	**763**	n.s.	n.s.	0	0	0
382	0	200	195	3	247	**764**	0	n.s.	0	60	45
721	663	161	41	97	310	**765**	0	0	0	10	0
722	14	19	42	43	40	**766**	0	0	0	0	0
723	266	75	43	169	114	**767**	n.s.	n.s.	0	0	0
724	36	111	31	0	0						

Table 11.- Thorny skate survey biomass (t) with SD and stratified mean catch per tow (kg) and SD by in NAFO Div. 3NO: 1997-2013.

Year	1997	1998	1999	2000	2001	2002	2003	2004	2005
Biomass	9779	18875	35004	50521	34948	30072	20508	44429	40473
SD	1544	3114	3736	7991	10687	9699	2371	5281	6171
MCPT	11.57	20.41	40.79	57.86	39.23	33.69	22.27	49.46	45.69
SD	1.74	3.26	4.32	9.12	6.99	10.91	2.57	5.82	7.00

Year	2006	2007	2008	2009	2010	2011	2012	2013
Biomass	47415	22223	25946	19959	17887	10365	28867	19640
SD	9207	2898	2641	2745	3539	1193	3010	2280
MCPT	55.81	28.10	28.82	22.10	21.22	11.71	32.65	22.24
SD	11.22	3.57	2.92	3.13	4.11	1.32	3.38	2.63

Table 12.- Thorny skate length weight relationships in Spanish Spring Surveys in NAFO Div. 3NO: 2009-2013. E(x) means Error of the parameter x.

	Males						**Females**						**Indet.**					
	a	**b**	**E(a)**	**E(b)**	**R2**	**N**	**a**	**b**	**E(a)**	**E(b)**	**R2**	**N**	**a**	**b**	**E(a)**	**E(b)**	**R2**	**N**
2009	**0.01044**	**2.97008**	0.1092	0.0274	0.995	185	**0.01033**	**2.98056**	0.2201	0.0563	0.982	193	**0.00930**	**3.00294**	0.1144	0.0293	0.994	378
2010	**0.00830**	**3.03702**	0.0793	0.0206	0.997	279	**0.00756**	**3.06772**	0.0807	0.0213	0.997	276	**0.00821**	**3.04177**	0.0674	0.0176	0.997	555
2011	**0.00247**	**3.32621**	0.4129	0.1021	0.957	186	**0.00896**	**3.01571**	0.1255	0.0309	0.995	176	**0.00349**	**3.24375**	0.3269	0.0827	0.964	362
2012	**0.00875**	**3.01113**	0.1202	0.0299	0.997	363	**0.00758**	**3.01571**	0.0967	0.0246	0.998	354	**0.09190**	**3.00833**	0.0919	0.0234	0.998	717
2013	**0.01045**	**2.96645**	0.0932	0.0231	0.996	357	**0.00735**	**3.05973**	0.1266	0.0315	0.994	359	**0.00979**	**2.98369**	0.0915	0.0229	0.996	716

Table 13.- Thorny skate mean number per tow by year in Spanish Spring Surveys in NAFO Div. 3NO: 1997-2013. Indet. means indeterminate.

	1997				1998				1999				2000				2001			
	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total
MNPT	4.803	5.892	0.000	10.695	7.158	7.649	0.000	14.808	11.173	11.271	0.029	22.472	13.760	14.185	0.000	27.945	8.996	10.572	0.000	19.568

	2002				2003				2004				2005				2006			
	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total
MNPT	9.903	11.540	0.005	21.448	5.660	6.802	0.000	12.461	11.985	13.529	0.000	25.514	11.235	12.125	0.000	23.360	11.658	15.005	0.000	26.663

	2007				2008				2009				2010				2011			
	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total
MNPT	5.501	5.955	0.000	11.456	5.484	5.701	0.000	11.184	4.218	3.999	0.000	8.217	5.689	6.037	0.000	11.726	1.811	1.598	0.000	3.410

	2012				2013			
	Males	Females	Indet.	Total	Males	Females	Indet.	Total
MNPT	5.801	5.470	0.000	11.271	4.193	3.782	0.000	7.975

Table 14.- Thorny skate mean number per tow by length class and year. Spanish Spring Survey in NAFO 3NO: 2009-2013. Indet. means indeterminate.

	2009				2010				2011				2012				2013			
Lenght (cm.)	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total
10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.000	0.000	0.005
12	0.000	0.005	0.000	0.005	0.047	0.060	0.000	0.107	0.000	0.000	0.000	0.000	0.002	0.005	0.000	0.007	0.015	0.015	0.000	0.030
14	0.013	0.000	0.000	0.013	0.142	0.166	0.000	0.308	0.026	0.000	0.000	0.026	0.009	0.011	0.000	0.021	0.005	0.010	0.000	0.016
16	0.020	0.018	0.000	0.038	0.106	0.063	0.000	0.169	0.000	0.000	0.000	0.000	0.004	0.048	0.000	0.052	0.000	0.000	0.000	0.000
18	0.000	0.010	0.000	0.010	0.124	0.025	0.000	0.149	0.000	0.005	0.000	0.005	0.013	0.000	0.000	0.013	0.000	0.000	0.000	0.000
20	0.025	0.014	0.000	0.040	0.203	0.163	0.000	0.366	0.000	0.000	0.000	0.000	0.007	0.000	0.000	0.007	0.006	0.000	0.000	0.006
22	0.013	0.015	0.000	0.029	0.071	0.178	0.000	0.249	0.000	0.000	0.000	0.000	0.034	0.000	0.000	0.034	0.249	0.000	0.000	0.249
24	0.033	0.036	0.000	0.069	0.198	0.209	0.000	0.407	0.022	0.000	0.000	0.022	0.000	0.027	0.000	0.027	0.000	0.000	0.000	0.000
26	0.000	0.006	0.000	0.006	0.165	0.126	0.000	0.291	0.000	0.016	0.000	0.016	0.014	0.013	0.000	0.027	0.005	0.000	0.000	0.005
28	0.035	0.045	0.000	0.080	0.113	0.066	0.000	0.179	0.005	0.000	0.000	0.005	0.009	0.000	0.000	0.009	0.014	0.014	0.000	0.028
30	0.058	0.021	0.000	0.079	0.053	0.186	0.000	0.239	0.011	0.000	0.000	0.011	0.041	0.069	0.000	0.110	0.047	0.008	0.000	0.055
32	0.045	0.028	0.000	0.073	0.229	0.279	0.000	0.508	0.028	0.021	0.000	0.049	0.053	0.045	0.000	0.098	0.064	0.014	0.000	0.078
34	0.015	0.098	0.000	0.113	0.161	0.290	0.000	0.451	0.000	0.012	0.000	0.012	0.018	0.082	0.000	0.100	0.014	0.015	0.000	0.029
36	0.117	0.054	0.000	0.171	0.144	0.214	0.000	0.358	0.000	0.000	0.000	0.000	0.060	0.164	0.000	0.223	0.036	0.071	0.000	0.107
38	0.059	0.068	0.000	0.127	0.240	0.300	0.000	0.540	0.011	0.008	0.000	0.020	0.101	0.115	0.000	0.215	0.134	0.105	0.000	0.239
40	0.058	0.115	0.000	0.173	0.147	0.234	0.000	0.381	0.026	0.057	0.000	0.083	0.205	0.182	0.000	0.387	0.148	0.134	0.000	0.282
42	0.082	0.015	0.000	0.097	0.167	0.152	0.000	0.319	0.021	0.000	0.000	0.021	0.198	0.242	0.000	0.440	0.096	0.166	0.000	0.261
44	0.079	0.094	0.000	0.173	0.223	0.144	0.000	0.367	0.011	0.021	0.000	0.032	0.156	0.182	0.000	0.338	0.136	0.193	0.000	0.329
46	0.065	0.064	0.000	0.129	0.218	0.193	0.000	0.411	0.025	0.023	0.000	0.048	0.114	0.165	0.000	0.279	0.144	0.165	0.000	0.309
48	0.088	0.075	0.000	0.164	0.116	0.177	0.000	0.293	0.006	0.013	0.000	0.019	0.139	0.164	0.000	0.303	0.111	0.148	0.000	0.259
50	0.115	0.117	0.000	0.233	0.045	0.098	0.000	0.143	0.068	0.000	0.000	0.068	0.180	0.144	0.000	0.324	0.074	0.137	0.000	0.212
52	0.051	0.105	0.000	0.156	0.083	0.139	0.000	0.222	0.045	0.032	0.000	0.077	0.157	0.161	0.000	0.318	0.060	0.092	0.000	0.152
54	0.135	0.110	0.000	0.245	0.125	0.147	0.000	0.272	0.000	0.032	0.000	0.032	0.197	0.198	0.000	0.395	0.084	0.075	0.000	0.159
56	0.142	0.110	0.000	0.251	0.165	0.242	0.000	0.407	0.038	0.015	0.000	0.053	0.120	0.251	0.000	0.371	0.230	0.101	0.000	0.331
58	0.153	0.133	0.000	0.286	0.156	0.079	0.000	0.234	0.031	0.031	0.000	0.062	0.258	0.086	0.000	0.344	0.077	0.096	0.000	0.174
60	0.224	0.257	0.000	0.480	0.113	0.253	0.000	0.366	0.083	0.023	0.000	0.106	0.109	0.102	0.000	0.211	0.033	0.071	0.000	0.105
62	0.173	0.117	0.000	0.290	0.091	0.254	0.000	0.345	0.049	0.087	0.000	0.136	0.207	0.134	0.000	0.341	0.124	0.072	0.000	0.195
64	0.108	0.336	0.000	0.444	0.157	0.343	0.000	0.500	0.075	0.062	0.000	0.137	0.179	0.289	0.000	0.469	0.063	0.111	0.000	0.174
66	0.149	0.130	0.000	0.279	0.168	0.140	0.000	0.308	0.096	0.180	0.000	0.276	0.193	0.266	0.000	0.459	0.127	0.154	0.000	0.281
68	0.299	0.372	0.000	0.671	0.169	0.165	0.000	0.333	0.061	0.112	0.000	0.173	0.180	0.359	0.000	0.539	0.105	0.231	0.000	0.336
70	0.160	0.463	0.000	0.623	0.358	0.151	0.000	0.509	0.038	0.185	0.000	0.223	0.168	0.470	0.000	0.638	0.133	0.339	0.000	0.473
72	0.223	0.434	0.000	0.657	0.158	0.179	0.000	0.337	0.192	0.156	0.000	0.348	0.317	0.411	0.000	0.728	0.156	0.310	0.000	0.466
74	0.348	0.165	0.000	0.513	0.191	0.221	0.000	0.412	0.218	0.219	0.000	0.437	0.331	0.290	0.000	0.621	0.146	0.267	0.000	0.413
76	0.351	0.209	0.000	0.559	0.155	0.231	0.000	0.386	0.141	0.085	0.000	0.226	0.484	0.370	0.000	0.855	0.224	0.246	0.000	0.470
78	0.222	0.119	0.000	0.341	0.260	0.072	0.000	0.333	0.193	0.055	0.000	0.248	0.473	0.171	0.000	0.644	0.299	0.141	0.000	0.440
80	0.277	0.011	0.000	0.287	0.067	0.064	0.000	0.131	0.095	0.080	0.000	0.175	0.240	0.117	0.000	0.357	0.207	0.123	0.000	0.331
82	0.155	0.012	0.000	0.167	0.174	0.027	0.000	0.202	0.084	0.020	0.000	0.104	0.316	0.081	0.000	0.397	0.291	0.078	0.000	0.369
84	0.083	0.002	0.000	0.086	0.067	0.000	0.000	0.067	0.019	0.019	0.000	0.037	0.232	0.041	0.000	0.273	0.147	0.030	0.000	0.176
86	0.021	0.014	0.000	0.036	0.024	0.000	0.000	0.024	0.079	0.016	0.000	0.095	0.088	0.009	0.000	0.096	0.137	0.009	0.000	0.146
88	0.008	0.000	0.000	0.008	0.072	0.000	0.000	0.072	0.000	0.013	0.000	0.013	0.071	0.000	0.000	0.071	0.114	0.032	0.000	0.146
90	0.000	0.000	0.000	0.000	0.020	0.005	0.000	0.025	0.000	0.000	0.000	0.000	0.024	0.000	0.000	0.024	0.082	0.006	0.000	0.087
92	0.014	0.002	0.000	0.016	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.052	0.005	0.000	0.057	0.015	0.000	0.000	0.015
94	0.000	0.000	0.000	0.000	0.004	0.000	0.000	0.004	0.008	0.000	0.000	0.008	0.013	0.000	0.000	0.013	0.012	0.000	0.000	0.012
96	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.000	0.000	0.006	0.020	0.000	0.000	0.020	0.009	0.000	0.000	0.009
98	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.012	0.000	0.000	0.012
100	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.013	0.000	0.000	0.013	0.000	0.000	0.000	0.000
102	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
104	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.000	0.000	0.005
106	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
108	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
110	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
112	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
114	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
116	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
118	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
120	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
122	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
124	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
126	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
128	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
130	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	4.218	3.999	0.000	8.217	5.689	6.037	0.000	11.726	1.811	1.598	0.000	3.410	5.801	5.470	0.000	11.271	4.193	3.782	0.000	7.975
Nº samples:				66				62				71				74				79
Nº Ind.:	392	331	0	723	375	383	0	758	183	174	0	357	496	480	0	976	357	362	0	719
Sampled catch:				2053				1464				1216				2912				2150
Range:				12-93				12-94				14-96				13-100				11-104
Total catch:				2410				1576				1398				2940				2253
Total hauls:				109				95				122				122				122

Table 15.- White hake mean catch (kg) and SD by stratum. Spanish Spring Surveys in NAFO Div. 3NO: 2009-2013. n.s. means stratum not surveyed.

	2009		2010		2011		2012		2013	
Stratum	White hake Mean catch	White hake SD	White hake Mean catch	White hake SD	White hake Mean catch	White hake SD	White hake Mean catch	White hake SD	White hake Mean catch	White hake SD
353	0.00	0.00	0.00	0.00	0.04	0.07	1.54	2.40	0.00	0.00
354	9.30	3.74	0.02	0.03	20.45	28.28	0.13	0.22	45.38	47.93
355	24.45	1.34	4.89	4.96	24.11	6.21	47.52	42.40	26.55	6.12
356	6.13	6.33	7.90	0.28	9.58	5.06	29.95	33.02	17.15	16.48
357	6.08	2.97	5.96	8.43	0.00	0.00	0.00	0.00	1.32	1.87
358	2.16	3.75	2.34	3.31	3.99	6.92	0.00	0.00	2.18	1.94
359	0.00	0.00	0.01	0.02	1.48	2.53	6.08	14.91	4.05	5.44
360	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.04	0.00	0.00
374	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
375	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
376	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
377	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
378	0.00	0.00	0.00	0.00	0.00	0.00	1.82	2.57	0.00	0.00
379	0.00	0.00	0.00	0.00	0.00	0.00	0.30	0.43	0.04	0.06
380	0.00	0.00	0.00	0.00	0.00	0.00	0.68	0.96	0.56	0.79
381	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
382	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
721	1.80	2.55	11.48	12.89	0.00	0.00	0.49	0.69	4.53	1.88
722	0.00	0.00	0.00	0.00	1.70	2.40	0.00	0.00	0.65	0.91
723	0.00	0.00	2.01	2.84	3.03	4.29	3.75	5.30	1.64	0.22
724	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
725	0.16	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
726	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
727	0.00	-	0.00	0.00	0.00	0.00	0.11	0.16	0.00	0.00
728	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
752	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
753	0.00	-	n.s.	n.s.	0.00	0.00	0.00	0.00	0.00	0.00
754	0.00	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
755	0.00	-	0.00	-	0.00	0.00	0.00	0.00	0.00	0.00
756	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
757	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
758	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
759	0.00	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
760	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
761	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
762	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
763	n.s.	n.s.	n.s.	n.s.	0.00	0.00	0.00	0.00	0.00	0.00
764	0.00	-	n.s.	n.s.	0.29	0.40	0.00	0.00	0.00	0.00
765	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
766	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
767	n.s.	n.s.	n.s.	n.s.	0.00	0.00	0.00	0.00	0.00	0.00

Table 16.- White hake survey biomass (t) by stratum in NAFO Div. 3NO: 2009-2013. n.s. means stratum not surveyed.

Strata	2009	2010	2011	2012	2013
353	0	0	1	37	0
354	203	0	437	3	992
355	156	32	153	307	175
356	25	33	39	125	72
357	171	87	0	0	18
358	43	47	78	0	44
359	0	0	54	222	144
360	0	0	0	4	0
374	0	0	0	0	0
375	0	0	0	0	0
376	0	0	0	0	0
377	0	0	0	0	0
378	0	0	0	22	0
379	0	0	0	3	0
380	0	0	0	6	5
381	0	0	0	0	0
382	0	0	0	0	0
721	10	66	0	3	26
722	0	0	13	0	5
723	0	28	43	52	23
724	0	0	0	0	0

Strata	2009	2010	2011	2012	2013
725	1	0	0	0	0
726	0	0	0	0	0
727	0	0	0	1	0
728	0	0	0	0	0
752	0	0	0	0	0
753	0	n.s.	0	0	0
754	0	0	0	0	0
755	0	0	0	0	0
756	0	0	0	0	0
757	0	0	0	0	0
758	0	0	0	0	0
759	0	0	0	0	0
760	0	0	0	0	0
761	0	0	0	0	0
762	0	0	0	0	0
763	n.s.	n.s.	0	0	0
764	0	n.s.	3	0	0
765	0	0	0	0	0
766	0	0	0	0	0
767	n.s.	n.s.	0	0	0

Table 17.- White hake survey biomass (t) with SD and stratified mean catch per tow (kg) and SD by in NAFO Div. 3NO: 1997-2013.

Year	2001	2002	2003	2004	2005	2006	2007
Biomass	3498	1784	688	940	2082	1073	440
SD	1107	389	224	464	1270	407	94
MCPT	5.13	2.03	0.75	1.03	2.34	1.26	0.56
SD	1.87	0.43	0.24	0.52	1.44	0.48	0.12

Year	2008	2009	2010	2011	2012	2013
Biomass	74	610	293	822	784	1503
SD	46	73	117	361	308	613
MCPT	0.08	0.61	0.34	0.91	0.86	1.64
SD	0.05	0.08	0.14	0.40	0.34	0.67

Table 18.- White hake length weight relationships in Spanish Spring Surveys in NAFO Div. 3NO: 2009-2013. E(x) means Error of the parameter x.

	Males						Females						Indet.					
	a	**b**	**E(a)**	**E(b)**	**R2**	**N**	**a**	**b**	**E(a)**	**E(b)**	**R2**	**N**	**a**	**b**	**E(a)**	**E(b)**	**R2**	**N**
2009	**0.00897**	**2.95767**	0.3934	0.0994	0.978	26	**0.00342**	**3.20533**	0.1912	0.0493	0.996	19	**0.00330**	**3.21086**	0.2001	0.0516	0.992	49
2010	**0.00310**	**3.21865**	0.2034	0.0543	0.997	13	**0.00188**	**3.37344**	0.1809	0.0446	0.998	16	**0.00200**	**3.35062**	0.1566	0.04	0.997	29
2011	-	-	-	-	-	-	-	-	-	-	-	-	**0.00337**	**3.21512**	0.1448	0.0382	0.994	122
2012	**0.00340**	**3.20604**	0.2635	0.0682	0.995	42	**0.00186**	**3.36229**	0.4467	0.1162	0.991	27	**0.00327**	**3.21907**	0.2547	0.0649	0.994	69
2013	**0.00336**	**3.19379**	0.1347	0.0358	0.995	100	**0.00157**	**3.38530**	0.1715	0.0438	0.992	110	**0.00237**	**3.28346**	0.1089	0.029	0.996	210

Table 19.- White hake mean number per tow by year in Spanish Spring Surveys in NAFO Div. 3NO: 1997-2013. Indet. means indeterminate.

	2001				2002				2003				2004				2005			
	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total
MNPT	5.462	4.544	0.015	10.022	1.511	1.091	0.000	2.602	0.387	0.295	0.000	0.682	0.480	0.447	0.000	0.927	0.953	0.579	0.000	1.532

	2006				2007				2008				2009				2010			
	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total
MNPT	0.512	0.172	0.000	0.684	0.115	0.161	0.000	0.275	0.025	0.012	0.000	0.037	0.184	0.208	0.002	0.394	0.078	0.085	0.000	0.162

	2011				2012				2013			
	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total
MNPT	0.000	0.000	0.882	0.882	0.676	0.418	0.000	1.094	0.877	0.891	0.000	1.768

Table 20.- White hake mean number per tow by length class and year. Spanish Spring Survey in NAFO 3NO: 2009-2013. Indet. means indeterminate.

	2009				2010				2011				2012				2013			
Lenght (cm.)	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total
10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
12	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.008	0.000	0.000	0.008
14	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.016	0.000	0.000	0.016
16	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.016	0.008	0.000	0.023
18	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.047	0.000	0.000	0.047
20	0.000	0.000	0.000	0.000	0.007	0.000	0.000	0.007	0.000	0.000	0.018	0.018	0.017	0.026	0.000	0.044	0.059	0.019	0.000	0.078
22	0.000	0.000	0.000	0.000	0.009	0.008	0.000	0.017	0.000	0.000	0.022	0.022	0.009	0.000	0.000	0.009	0.070	0.047	0.000	0.117
24	0.000	0.003	0.000	0.003	0.004	0.000	0.000	0.004	0.000	0.000	0.025	0.025	0.026	0.000	0.000	0.026	0.064	0.094	0.000	0.158
26	0.000	0.007	0.000	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.044	0.044	0.000	0.017	0.000	0.017	0.031	0.036	0.000	0.067
28	0.007	0.007	0.000	0.014	0.000	0.000	0.000	0.000	0.000	0.000	0.037	0.037	0.000	0.000	0.000	0.000	0.000	0.009	0.000	0.009
30	0.000	0.000	0.000	0.000	0.000	0.008	0.000	0.008	0.000	0.000	0.047	0.047	0.000	0.005	0.000	0.005	0.012	0.012	0.000	0.025
32	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.059	0.059	0.011	0.000	0.000	0.011	0.008	0.000	0.000	0.008
34	0.007	0.008	0.000	0.014	0.000	0.000	0.000	0.000	0.000	0.000	0.069	0.069	0.012	0.018	0.000	0.030	0.016	0.000	0.000	0.016
36	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.076	0.076	0.044	0.032	0.000	0.076	0.016	0.016	0.000	0.031
38	0.008	0.000	0.000	0.008	0.000	0.008	0.000	0.008	0.000	0.000	0.046	0.046	0.083	0.041	0.000	0.124	0.042	0.019	0.000	0.061
40	0.008	0.007	0.000	0.014	0.000	0.000	0.000	0.000	0.000	0.000	0.074	0.074	0.088	0.054	0.000	0.142	0.013	0.016	0.000	0.028
42	0.008	0.003	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.036	0.036	0.098	0.068	0.000	0.166	0.048	0.042	0.000	0.090
44	0.000	0.007	0.000	0.007	0.003	0.000	0.000	0.003	0.000	0.000	0.005	0.005	0.082	0.054	0.000	0.136	0.077	0.024	0.000	0.101
46	0.007	0.011	0.000	0.018	0.004	0.002	0.000	0.006	0.000	0.000	0.021	0.021	0.021	0.018	0.000	0.039	0.051	0.045	0.000	0.096
48	0.013	0.000	0.000	0.013	0.003	0.000	0.000	0.003	0.000	0.000	0.007	0.007	0.054	0.021	0.000	0.075	0.041	0.040	0.000	0.082
50	0.014	0.000	0.000	0.014	0.008	0.000	0.000	0.008	0.000	0.000	0.012	0.012	0.018	0.009	0.000	0.028	0.058	0.072	0.000	0.130
52	0.018	0.007	0.000	0.024	0.000	0.000	0.000	0.000	0.000	0.000	0.020	0.020	0.014	0.004	0.000	0.017	0.065	0.059	0.000	0.124
54	0.000	0.014	0.000	0.014	0.000	0.002	0.000	0.002	0.000	0.000	0.004	0.004	0.008	0.007	0.000	0.015	0.020	0.077	0.000	0.097
56	0.011	0.008	0.000	0.019	0.000	0.006	0.000	0.006	0.000	0.000	0.020	0.020	0.009	0.015	0.000	0.025	0.021	0.042	0.000	0.062
58	0.014	0.000	0.002	0.016	0.003	0.000	0.000	0.003	0.000	0.000	0.029	0.029	0.013	0.002	0.000	0.015	0.023	0.038	0.000	0.061
60	0.028	0.016	0.000	0.044	0.004	0.003	0.000	0.007	0.000	0.000	0.049	0.049	0.009	0.004	0.000	0.013	0.020	0.027	0.000	0.047
62	0.010	0.003	0.000	0.014	0.000	0.000	0.000	0.000	0.000	0.000	0.028	0.028	0.013	0.002	0.000	0.015	0.010	0.016	0.000	0.026
64	0.003	0.086	0.000	0.089	0.032	0.000	0.000	0.032	0.000	0.000	0.015	0.015	0.010	0.006	0.000	0.016	0.000	0.027	0.000	0.027
66	0.011	0.000	0.000	0.011	0.000	0.008	0.000	0.008	0.000	0.000	0.028	0.028	0.006	0.000	0.000	0.006	0.015	0.008	0.000	0.023
68	0.008	0.011	0.000	0.019	0.000	0.000	0.000	0.000	0.000	0.000	0.010	0.010	0.005	0.002	0.000	0.007	0.002	0.014	0.000	0.017
70	0.003	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.024	0.024	0.012	0.004	0.000	0.015	0.000	0.000	0.000	0.000
72	0.000	0.003	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.020	0.020	0.006	0.002	0.000	0.008	0.005	0.011	0.000	0.017
74	0.008	0.008	0.000	0.015	0.000	0.011	0.000	0.011	0.000	0.000	0.008	0.008	0.004	0.000	0.000	0.004	0.003	0.000	0.000	0.003
76	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.003	0.000	0.000	0.008	0.008	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.011
78	0.000	0.000	0.000	0.000	0.000	0.007	0.000	0.007	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.002	0.000	0.016	0.000	0.016
80	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.002	0.000	0.000	0.000	0.000
82	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.008	0.008	0.000	0.000	0.000	0.000	0.000	0.023	0.000	0.023
84	0.000	0.000	0.000	0.000	0.000	0.017	0.000	0.017	0.000	0.000	0.015	0.015	0.000	0.000	0.000	0.000	0.000	0.008	0.000	0.008
86	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.008	0.000	0.008
88	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.008	0.000	0.008	0.000	0.008	0.000	0.008
Total	0.184	0.208	0.002	0.394	0.078	0.085	0.000	0.162	0.000	0.000	0.882	0.882	0.676	0.418	0.000	1.094	0.877	0.891	0.000	1.768
Nº samples:				9				10				14				12				20
Nº Ind.:	38	25	1	64	14	16	0	30	0	0	156	156	156	98	0	254	145	139	0	284
Sampled catch:				100				562				149				217				274
Range:				24-75				20-84				20-84				20-89				13-89
Total catch:				112				69				161				217				276
Total hauls:				109				95				122				122				122

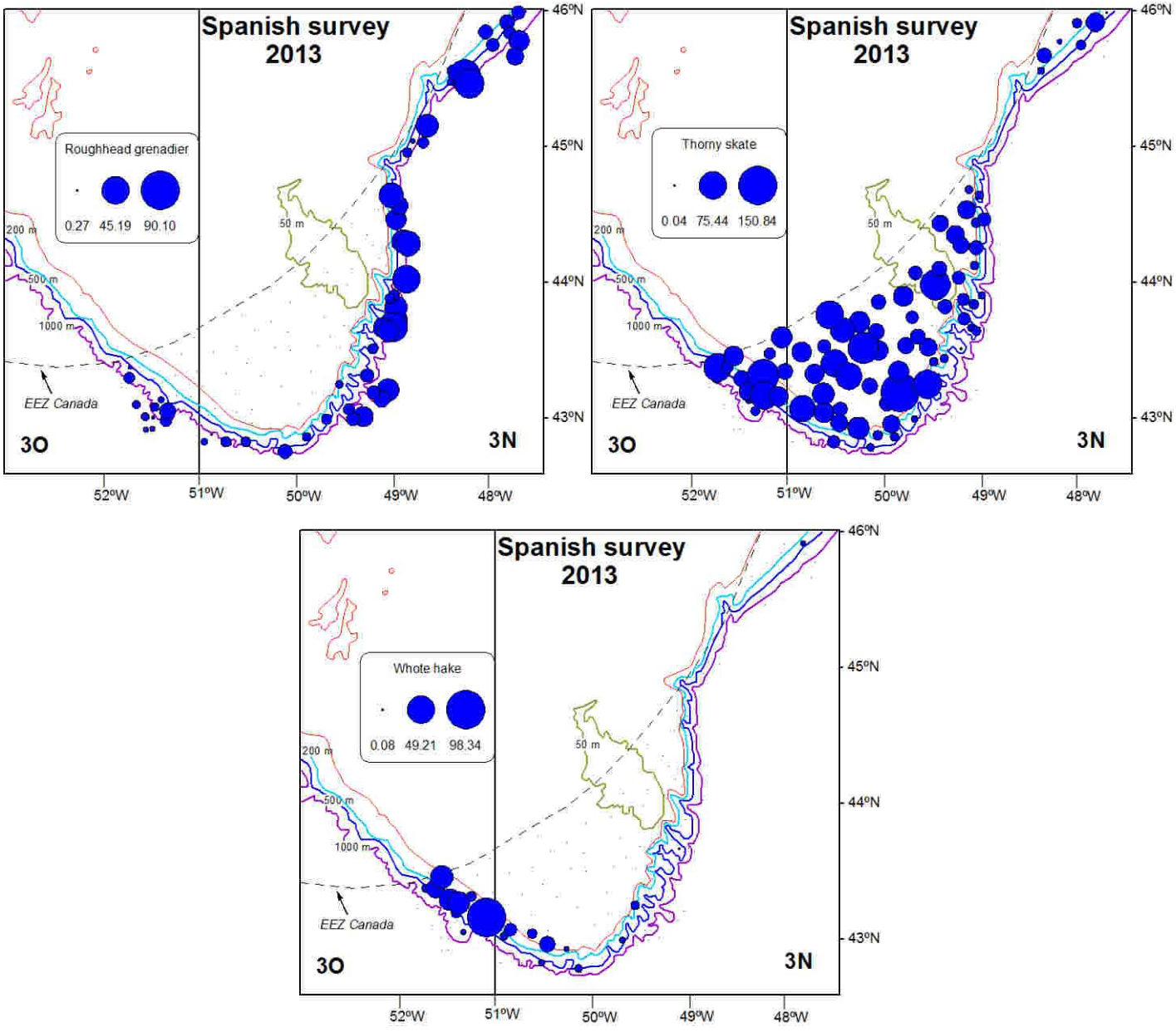

Figure 1.- Position of the hauls and the catch of roughhead grenadier, thorny skate and white hake during the 2013 Spanish 3NO survey. Note that the scale is different in the three graphs.

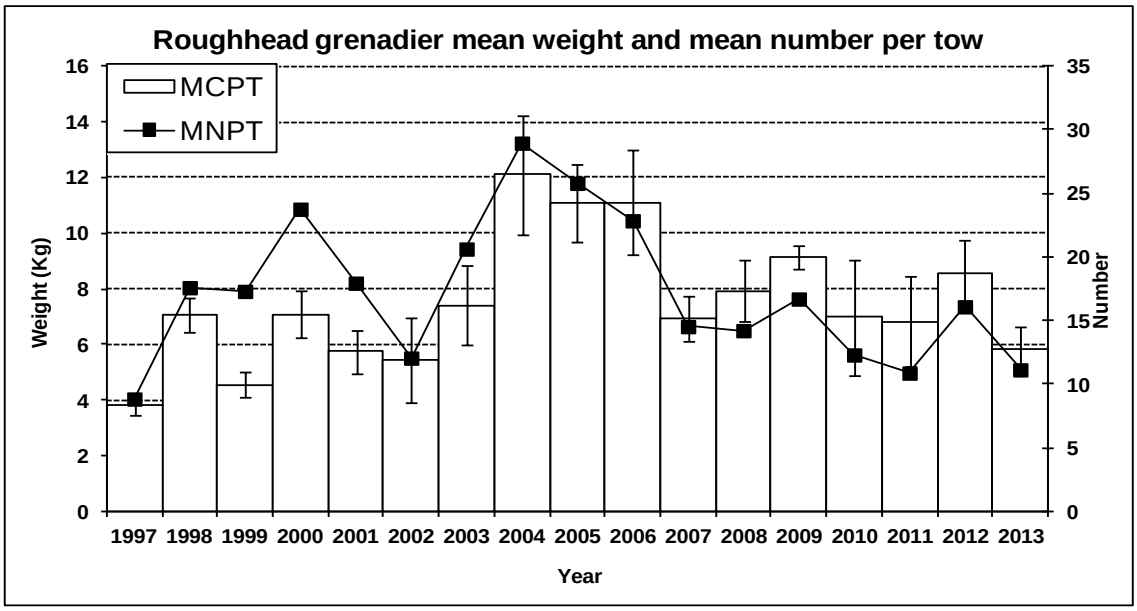

Figure 2.- Roughhead grenadier stratified mean catches in Kg and ±SD by year and mean number by year. Spanish Spring surveys in NAFO Div. 3NO: 1997-2013.

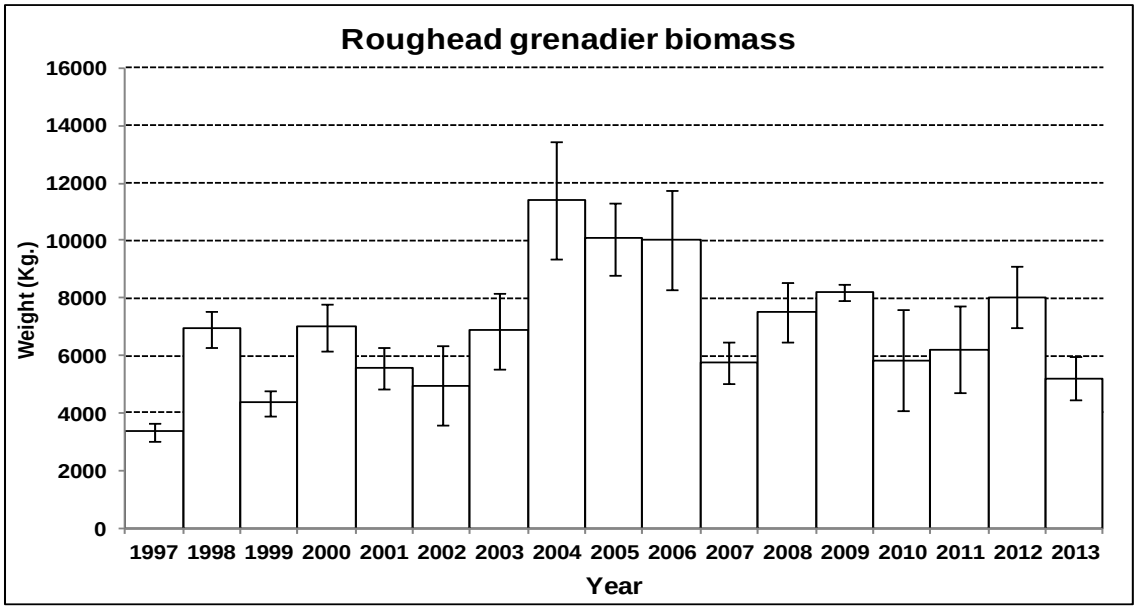

Figure 3.- Roughhead grenadier biomass calculated by the swept area method in tons and ±SD by year. Spanish Spring surveys in NAFO Div. 3NO: 1997-2013.

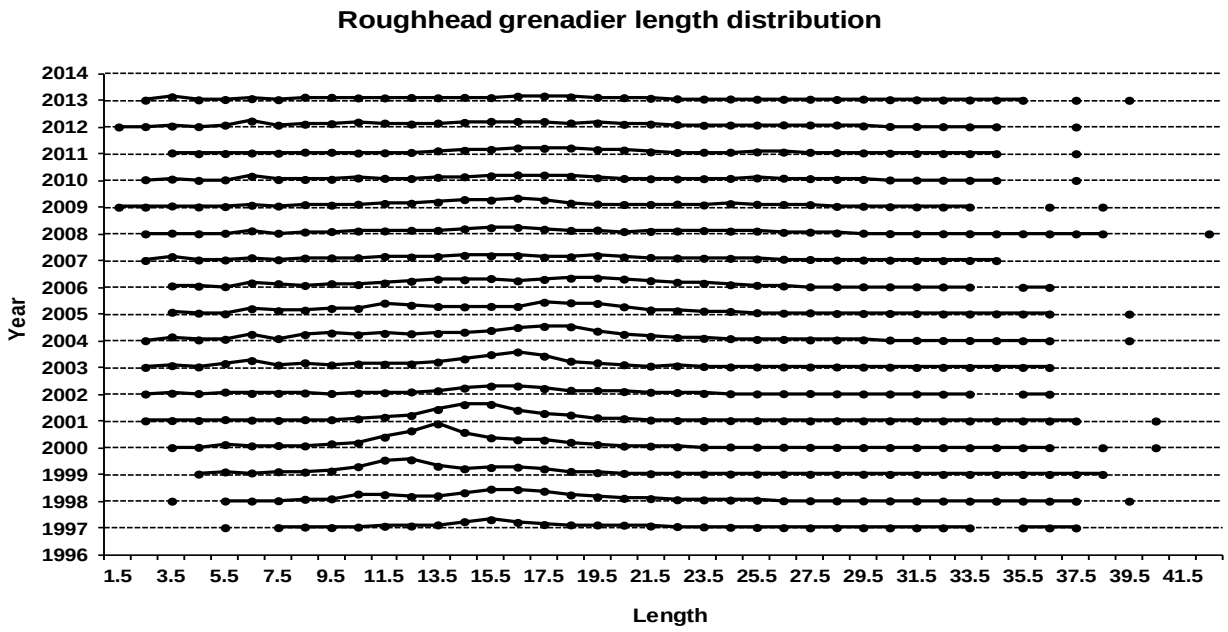

Figure 4.- Roughhead grenadier mean catches per tow length distribution (cm) on NAFO 3NO: 1997-2013. Data from 2009 to 2013 are in Table 8; data for 1997-2008 can be seen in SCR Doc 13/12.

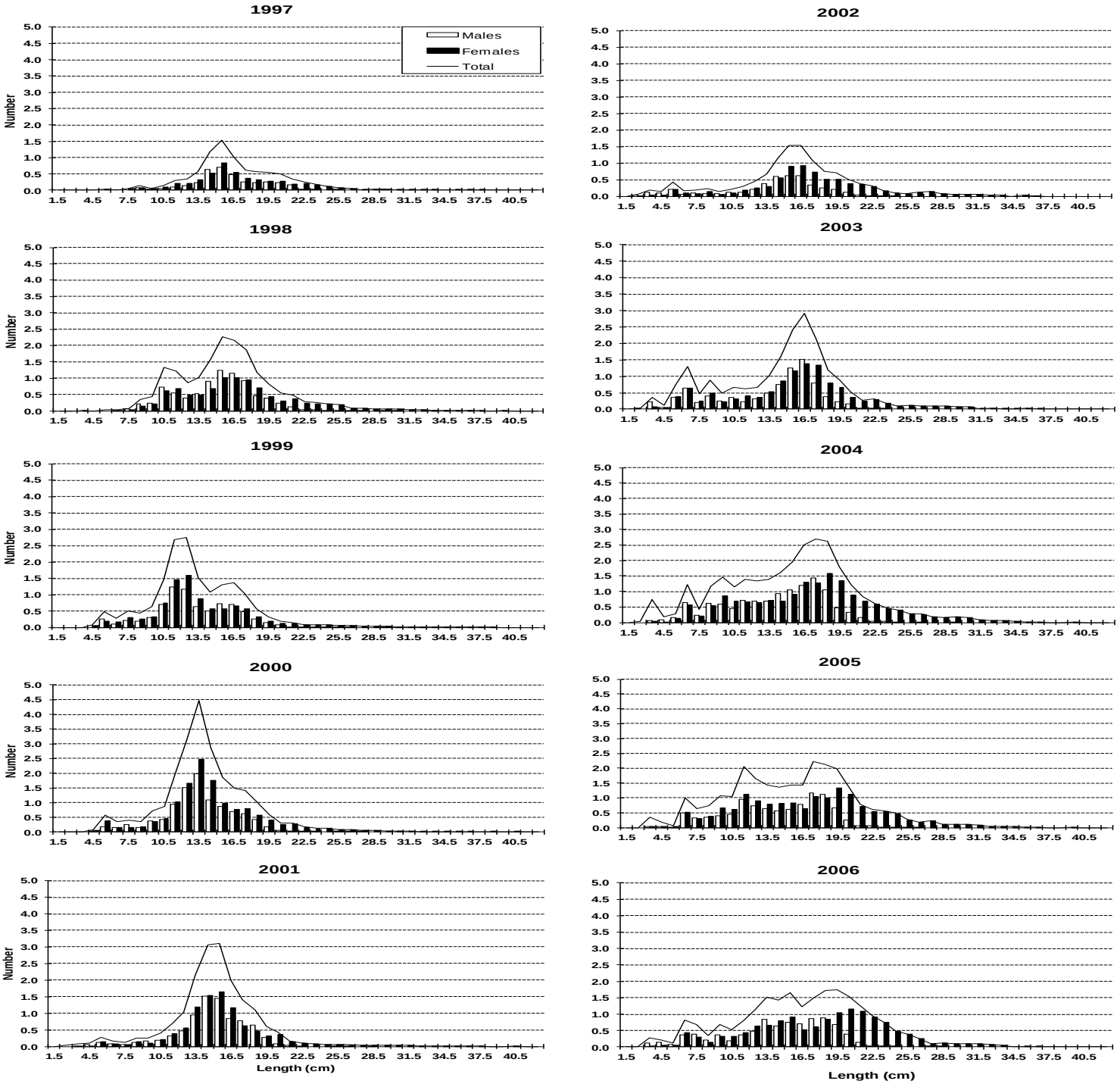

Figure 5.- Roughhead grenadier length distribution (cm) on NAFO 3NO: 1997-2013. Mean catches per tow number. Data from 2009 to 2013 are in Table 8; data for 1997-2008 can be seen in SCR Doc 13/12.

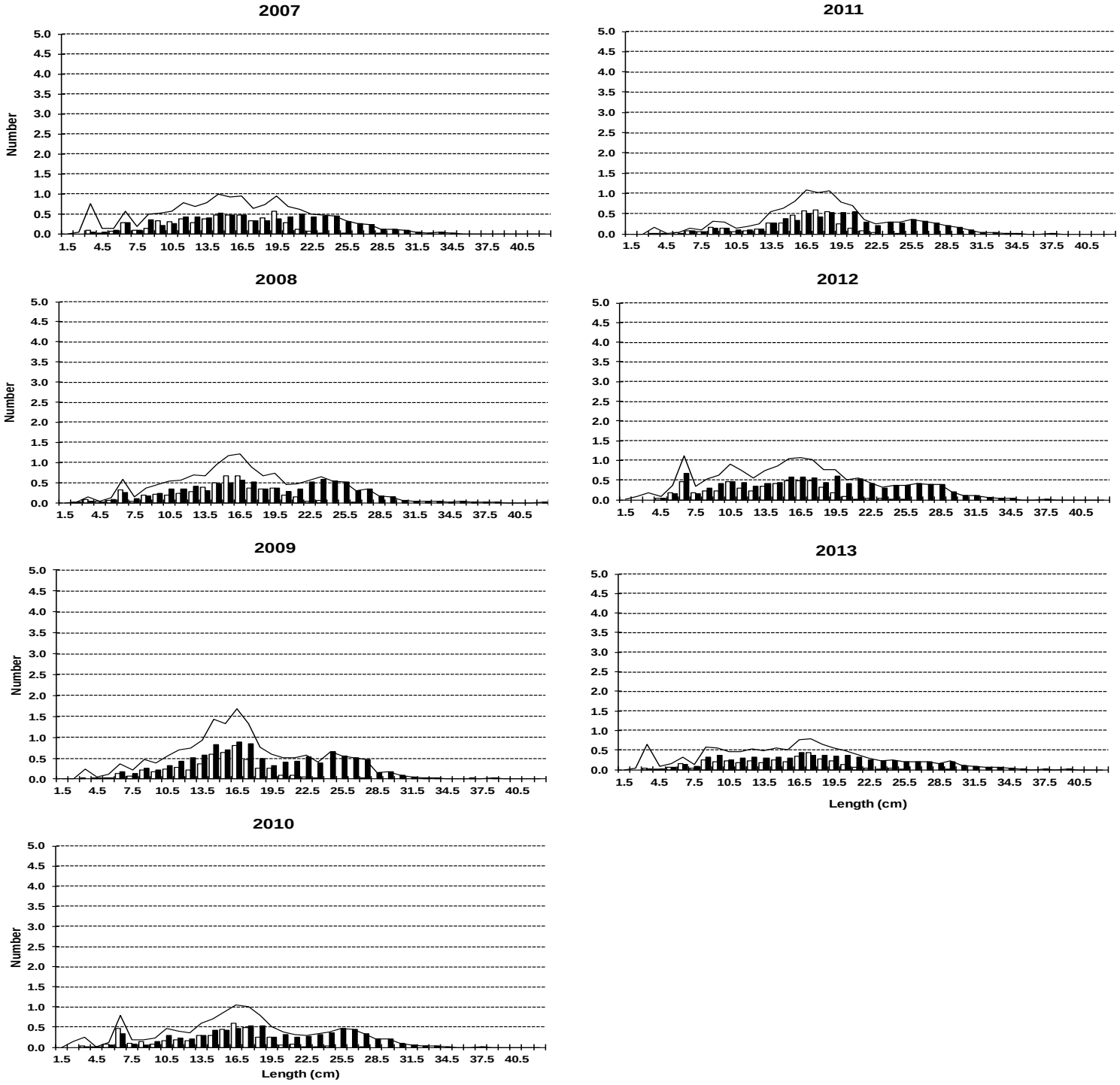

Figure 5 (cont.).- Roughhead grenadier length distribution (cm) on NAFO 3NO: 1997-2013. Mean catches per tow number. Data from 2009 to 2013 are in Table 8; data for 1997-2008 can be seen in SCR Doc 13/12.

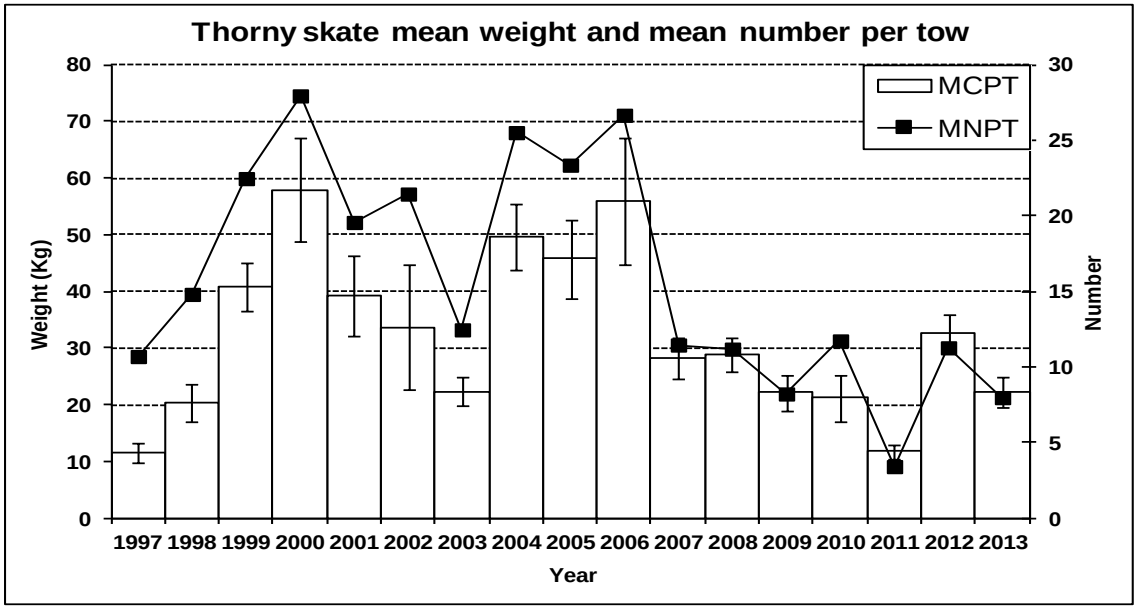

Figure 6.- Thorny skate stratified mean catches in Kg and ±SD by year and mean number by year. Spanish Spring surveys in NAFO Div. 3NO: 1997-2013.

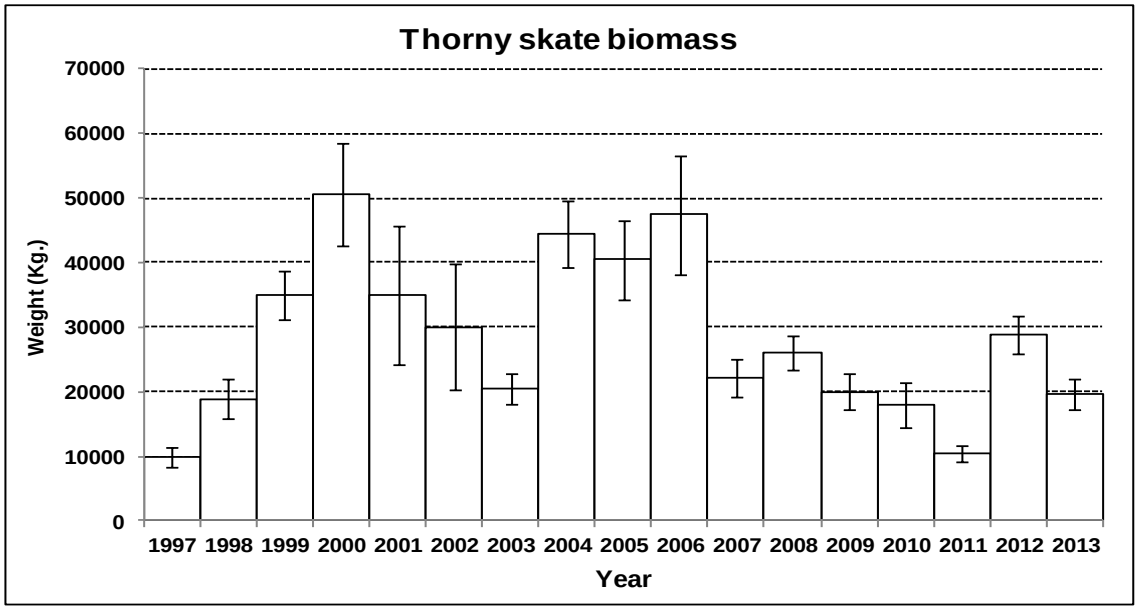

Figure 7.- Thorny skate biomass calculated by the swept area method in tons and ±SD by year. Spanish Spring surveys in NAFO Div. 3NO: 1997-2013.

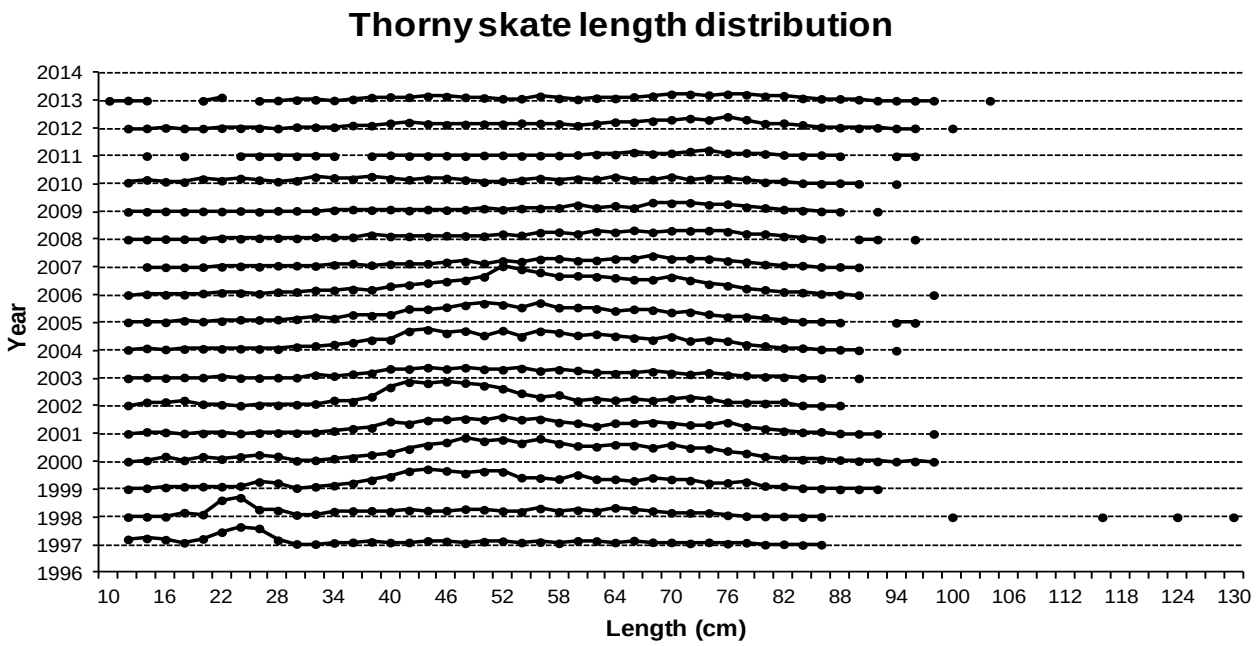

Figure 8.- Thorny skate mean catches per tow length distribution (cm) on NAFO 3NO: 1997-2013. Data from 2009 to 2013 are in Table 14; data for 1997-2008 can be seen in SCR Doc 13/12.

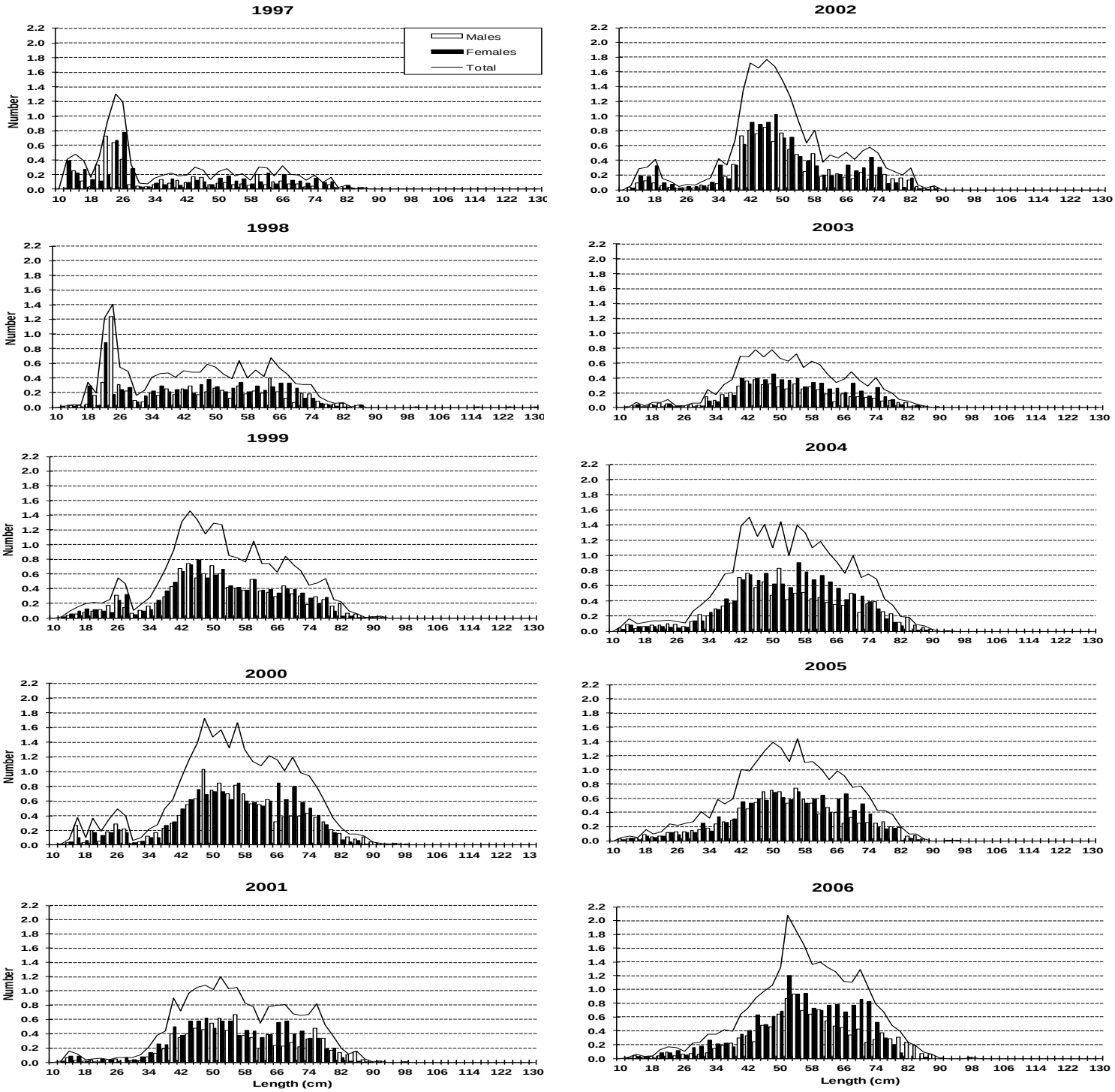

Figure 9.- Thorny skate length distribution (cm) on NAFO 3NO: 1997-2013. Mean catches per tow number. Data from 2009 to 2013 are in Table 14; data for 1997-2008 can be seen in SCR Doc 13/12.

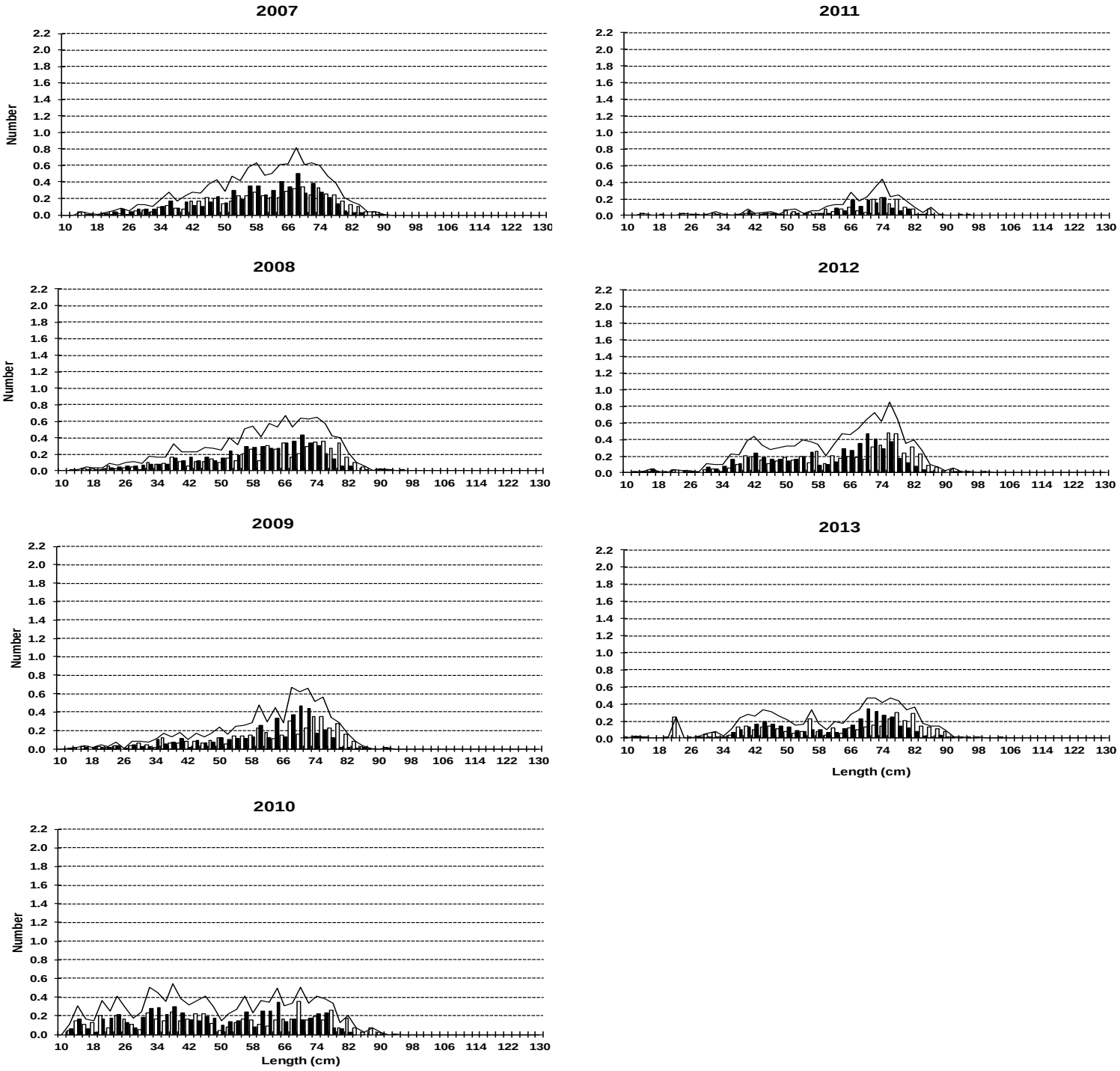

Figure 9 (cont.).- Thorny skate length distribution (cm) on NAFO 3NO: 1997-2013. Mean catches per tow number. Data from 2009 to 2013 are in Table 8; data for 1997-2008 can be seen in SCR Doc 13/12.

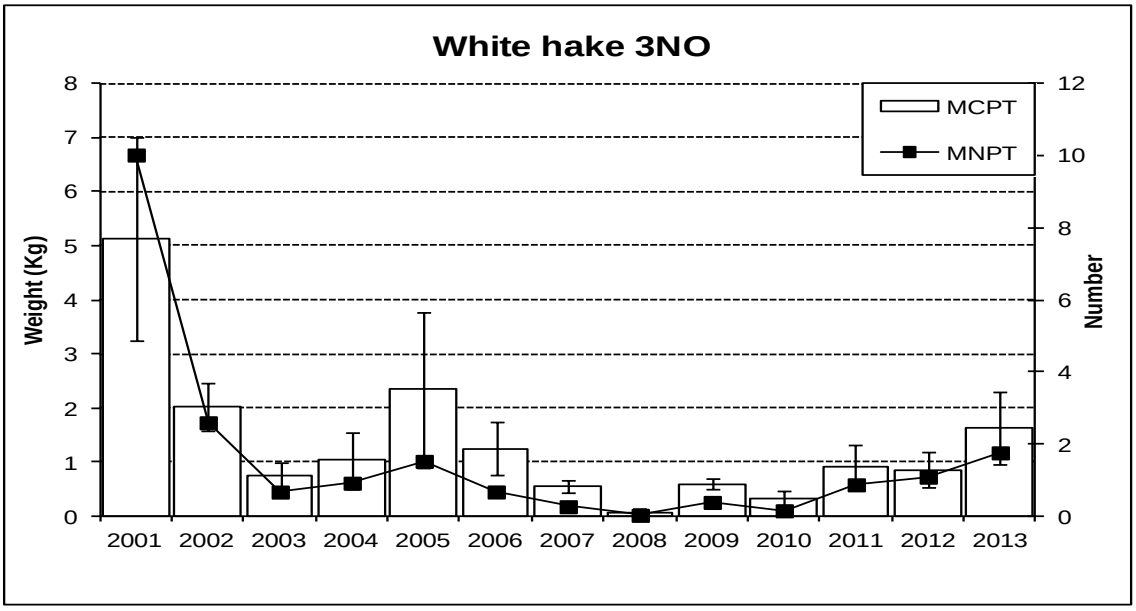

Figure 10.- White hake stratified mean catches in Kg and ±SD by year and mean number by year. Spanish Spring surveys in NAFO Div. 3NO: 2001-2013.

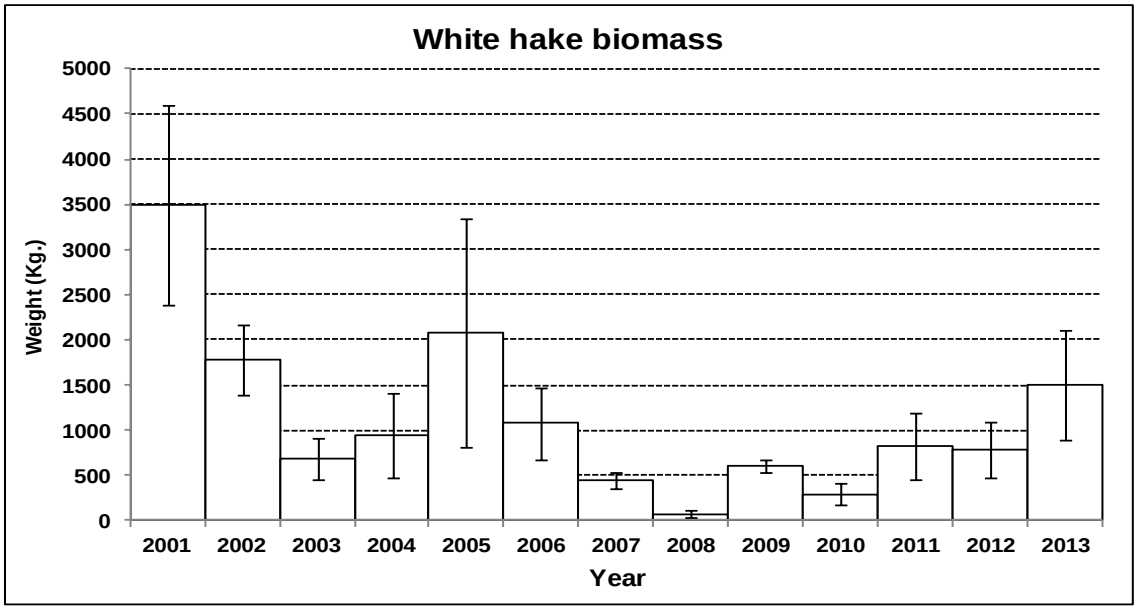

Figure 11.- White hake biomass calculated by the swept area method in tons and ±SD by year. Spanish Spring surveys in NAFO Div. 3NO: 2001-2013.

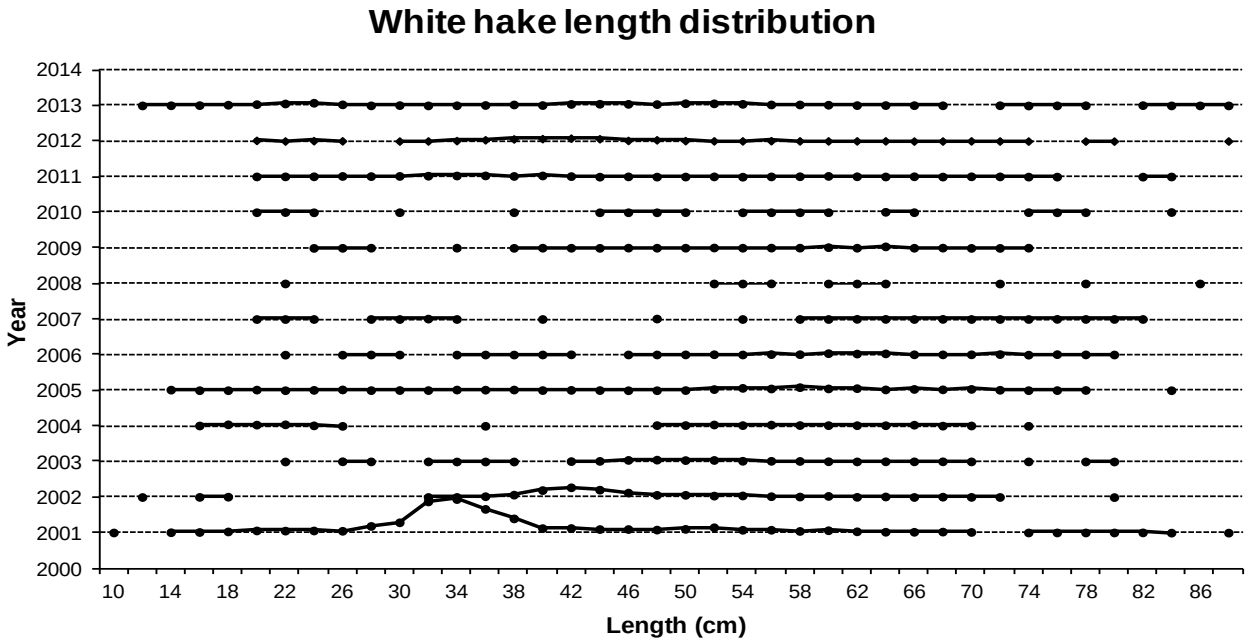

Figure 12.- White hake mean catches per tow length distribution (cm) on NAFO 3NO: 2001-2013. Data from 2009 to 2013 are in Table 20; data for 2001-2008 can be seen in SCR Doc 13/12.

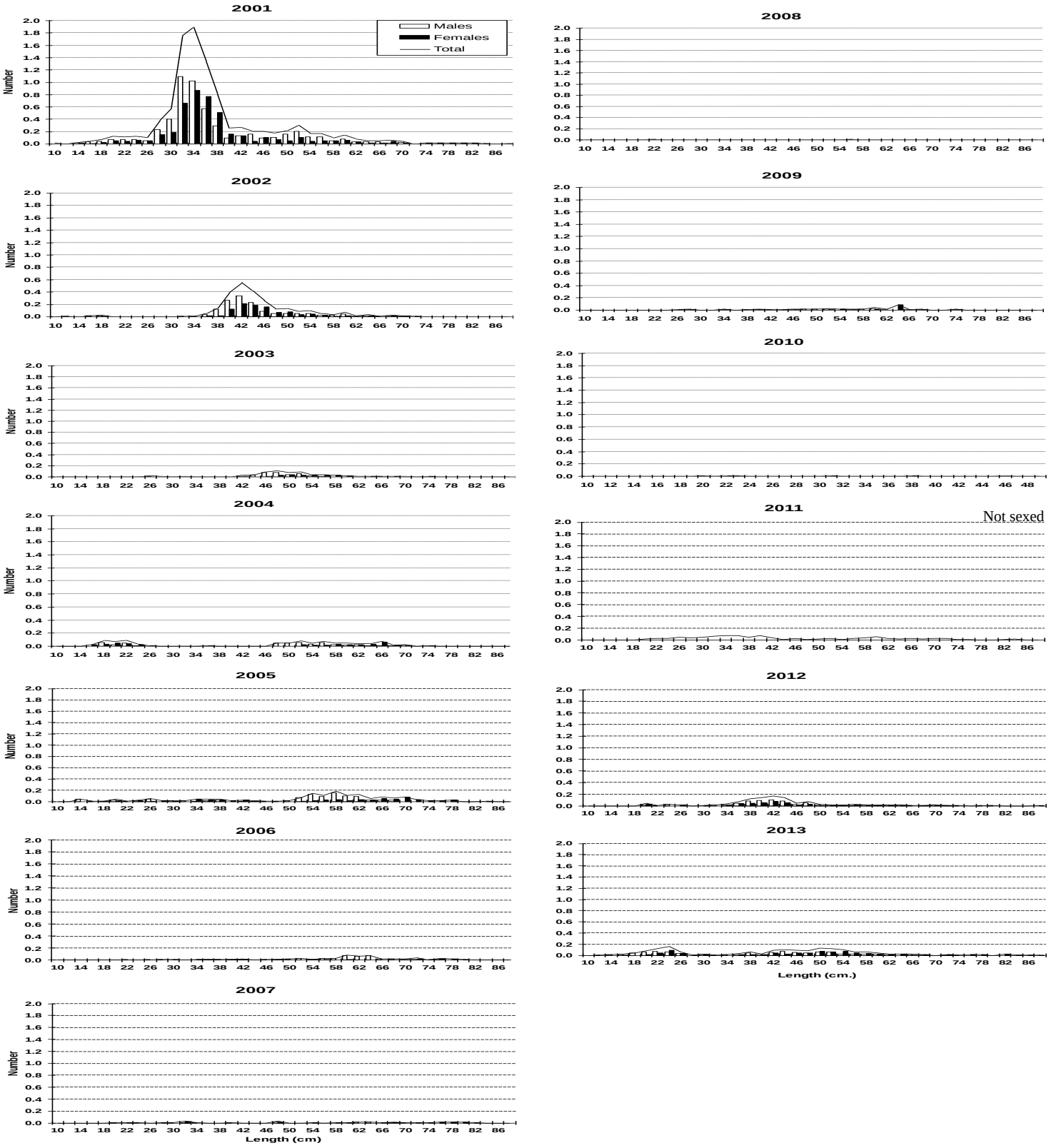

Figure 13.- White hake length distribution (cm) on NAFO 3NO: 2001-2013. Mean catches per tow number. Data from 2009 to 2013 are in Table 20; data for 2001-2008 can be seen in SCR Doc 13/12.